

# Recent Drought in Colorado

**Nolan Doesken  
Colorado Climate Center**

**Presented to Joint Residuals and Biosolids Management  
Conference 2007, April 17, 2007,  
Denver, Colorado**

**<http://ccc.atmos.colostate.edu>**

Prepared by Odie Bliss

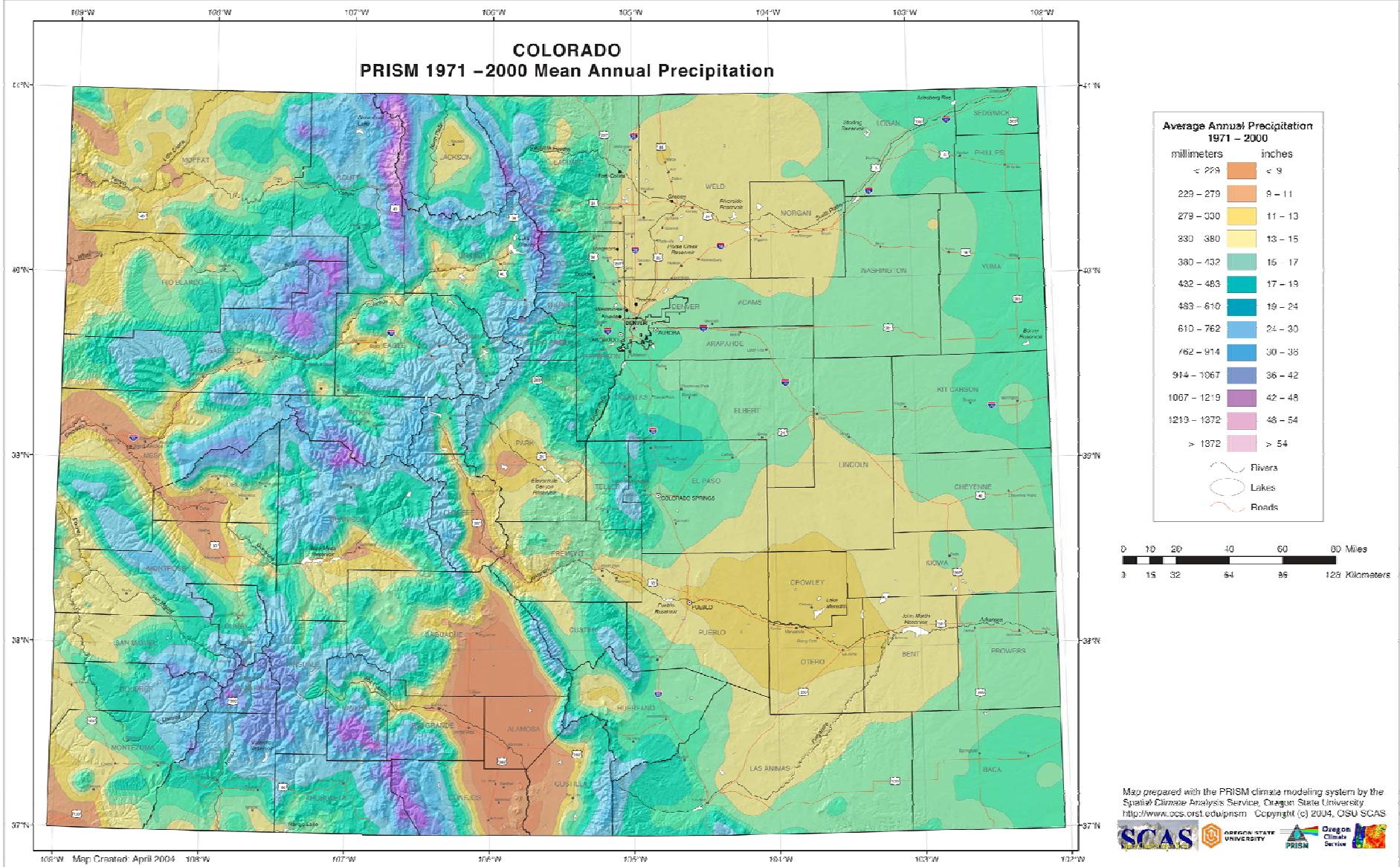


# Colorado Climate in Perspective

A wide-angle photograph of a massive, dark, supercell thunderstorm. The storm's base is a bright, white-grey color, contrasting sharply with the deep, dark grey clouds above. It spans across most of the upper half of the frame. Below the storm, a flat, open landscape stretches towards the horizon. The foreground shows a mix of green grass and brown, dry ground, possibly a field or prairie. A few small, isolated buildings are visible in the far distance under the overcast sky.

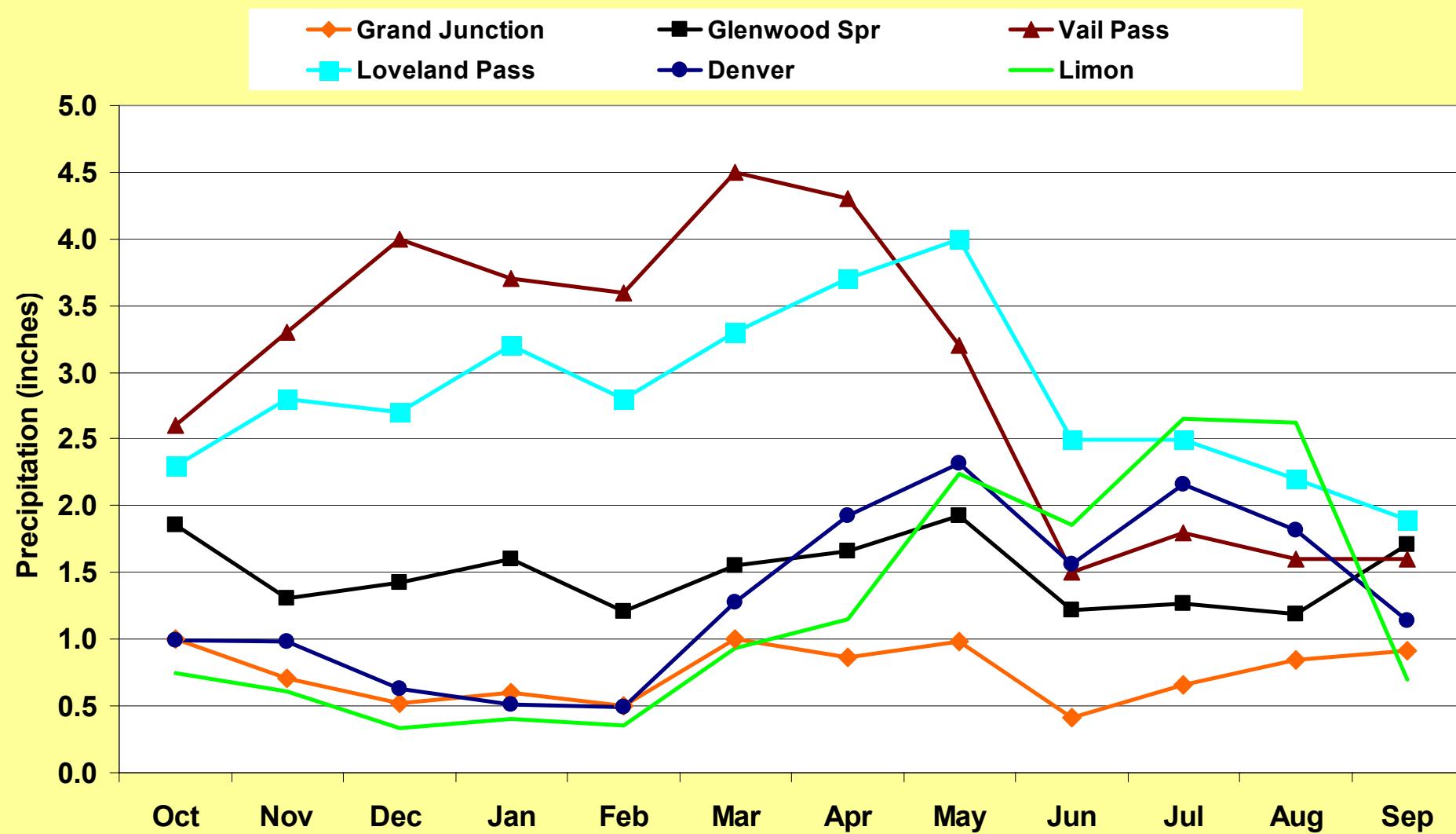
Strasburg, Colo, Photo by Ian Wittmeyer

# Colorado Average Annual Precipitation



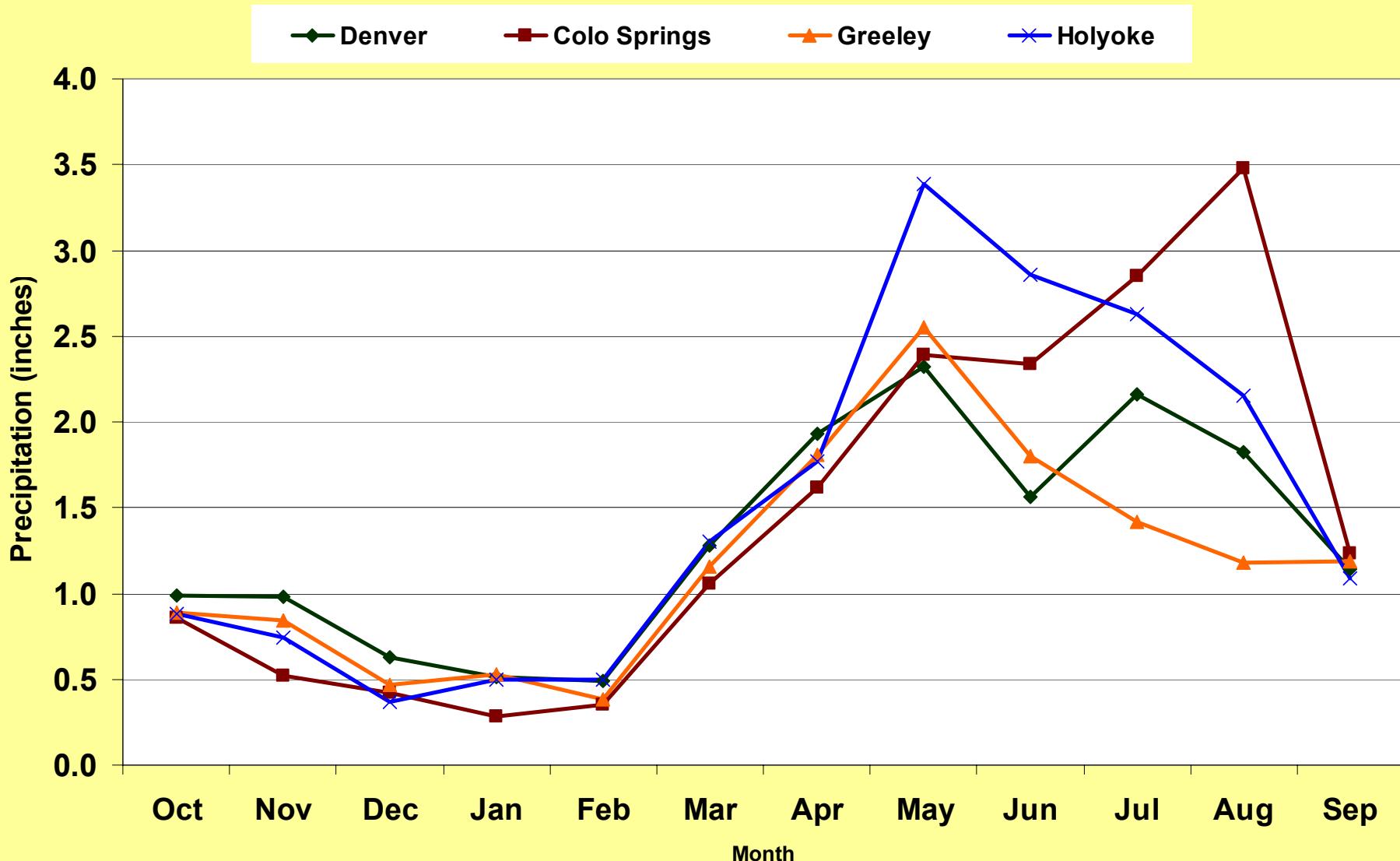
# I-70 Transect average monthly precipitation

Water Year Average Precipitation for Selected Stations



# Selected Colorado Average Precipitation Sites

Average Monthly Precipitation (1971-2000 Averages) for Selected Stations

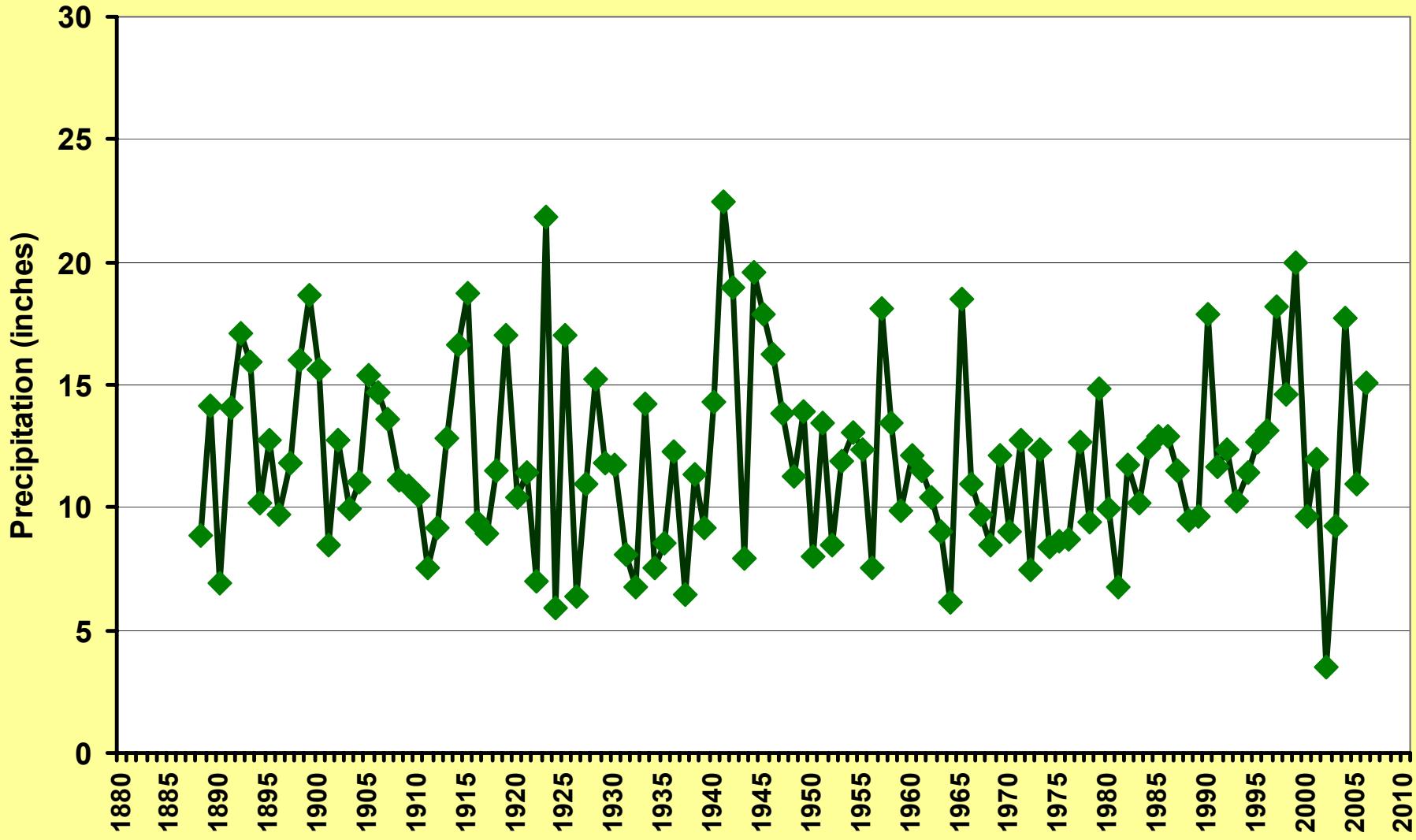


## A few things to remember:

- Precipitation is Highly Variable
- A few storms contribute a large percentage of annual precipitation
- When those storms are not present, drought emerges quickly

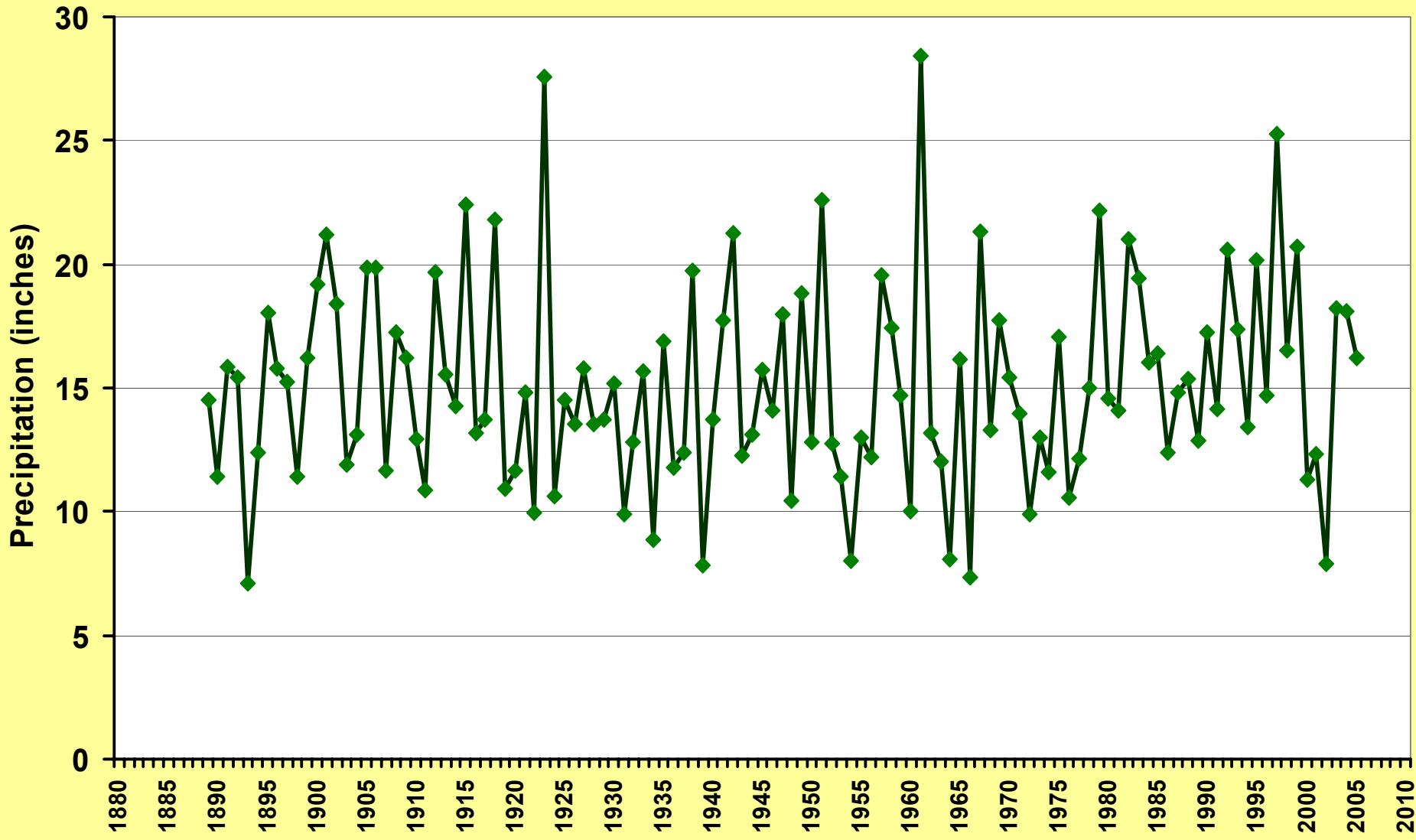
# Rocky Ford Precipitation

## Rocky Ford Annual Precipitation



# Fort Collins

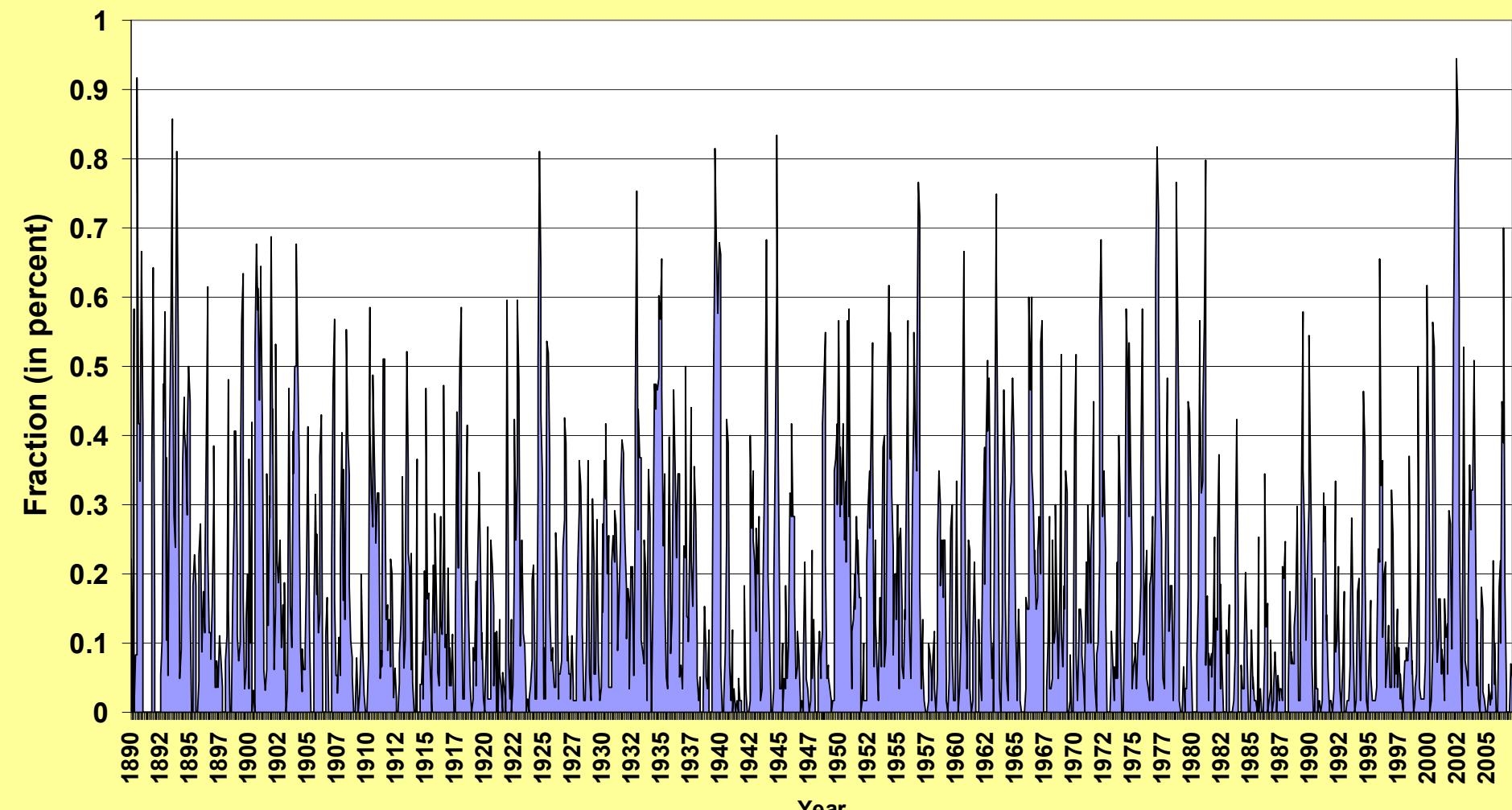
## Fort Collins Annual Precipitation



# 3-Month SPI

## Fraction of Colorado in Drought Based on 3 month SPI

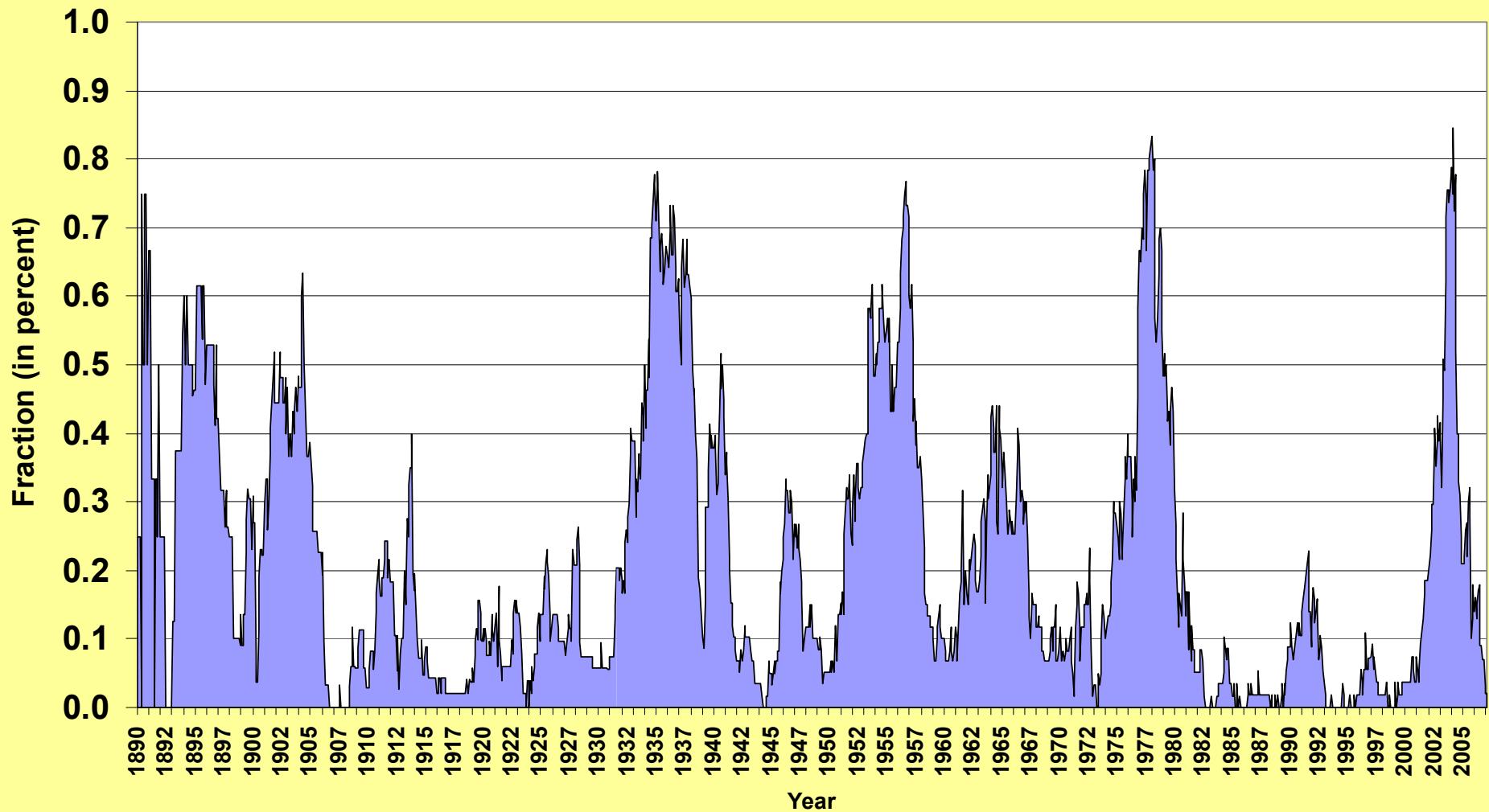
(1890 - Feb 2007)



# 48-Month SPI

## Fraction of Colorado in Drought Based on 48 month SPI

(1890 - Feb 2007)

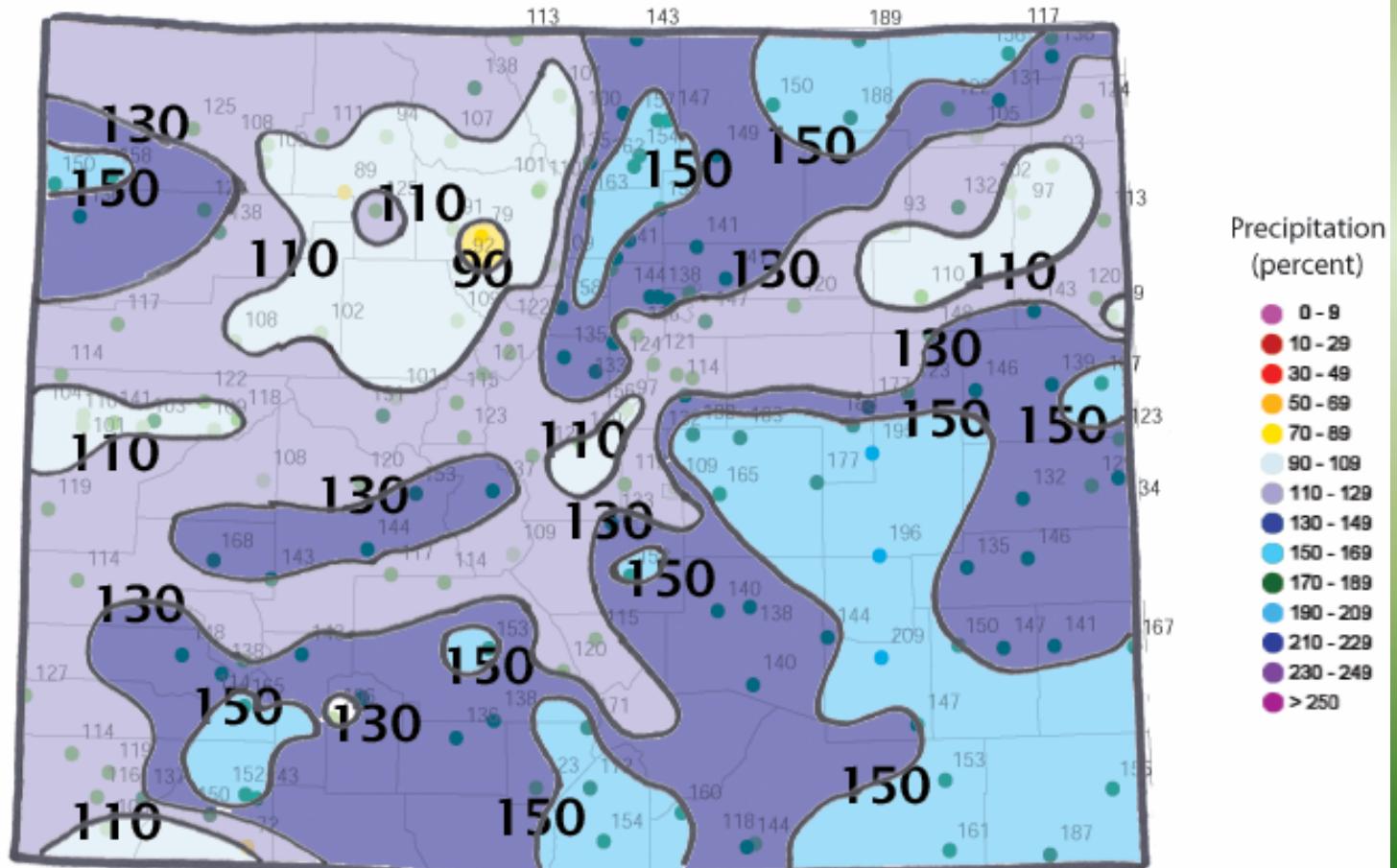


Can you remember the past few years?



# 1999 Water Year Precipitation

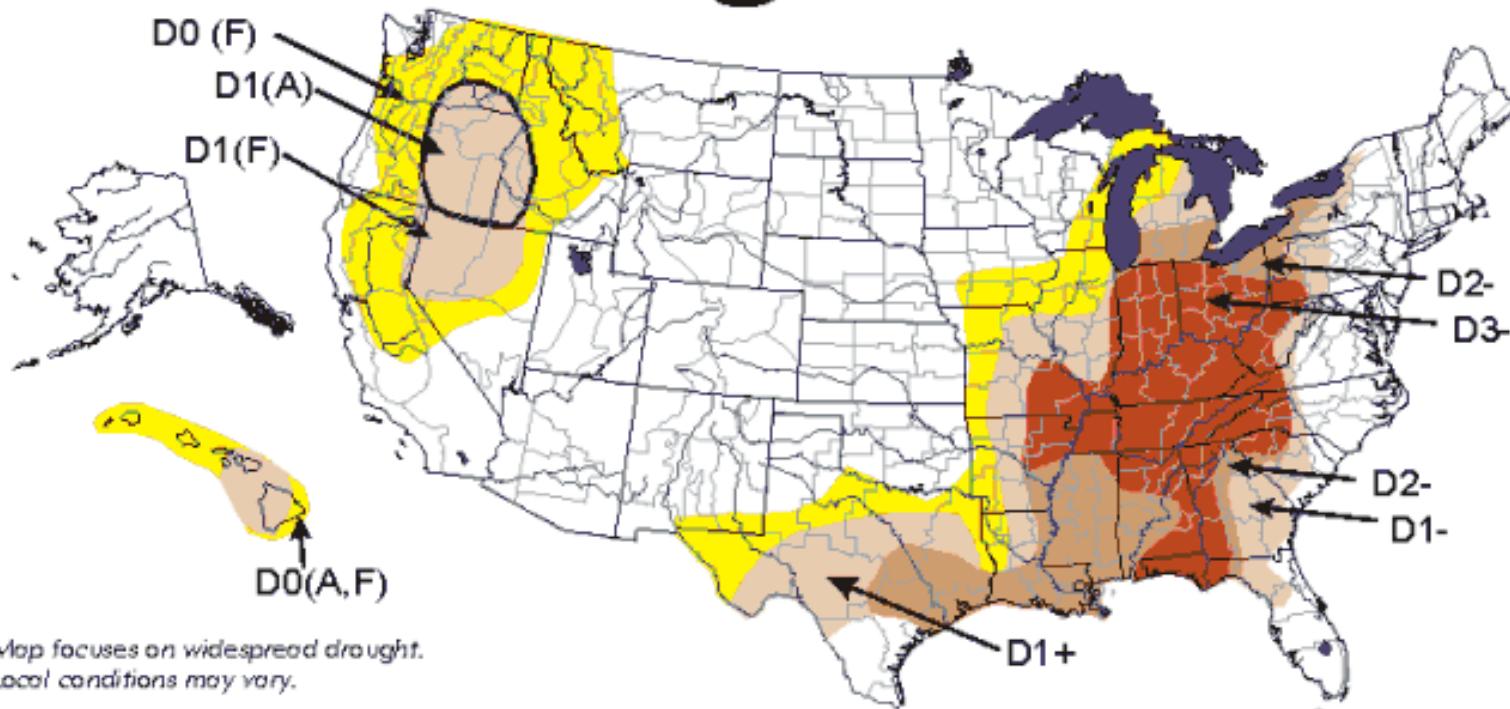
Water Year 1999  
(Oct. 1998-Sept. 1999)  
Precipitation Percent of Average for 1961-1990 Averages



# Sept 1999 Drought Monitor Map

September 28, 1999

## U.S. Drought Monitor



D0 Watch  
D1 Drought  
D2 Drought-Severe  
D3 Drought-Extreme  
D4 Drought-Exceptional  
Delineates Overlapping Areas

Drought type: used only when impacts differ  
A = Agriculture  
W = Water  
F = Forest fire danger

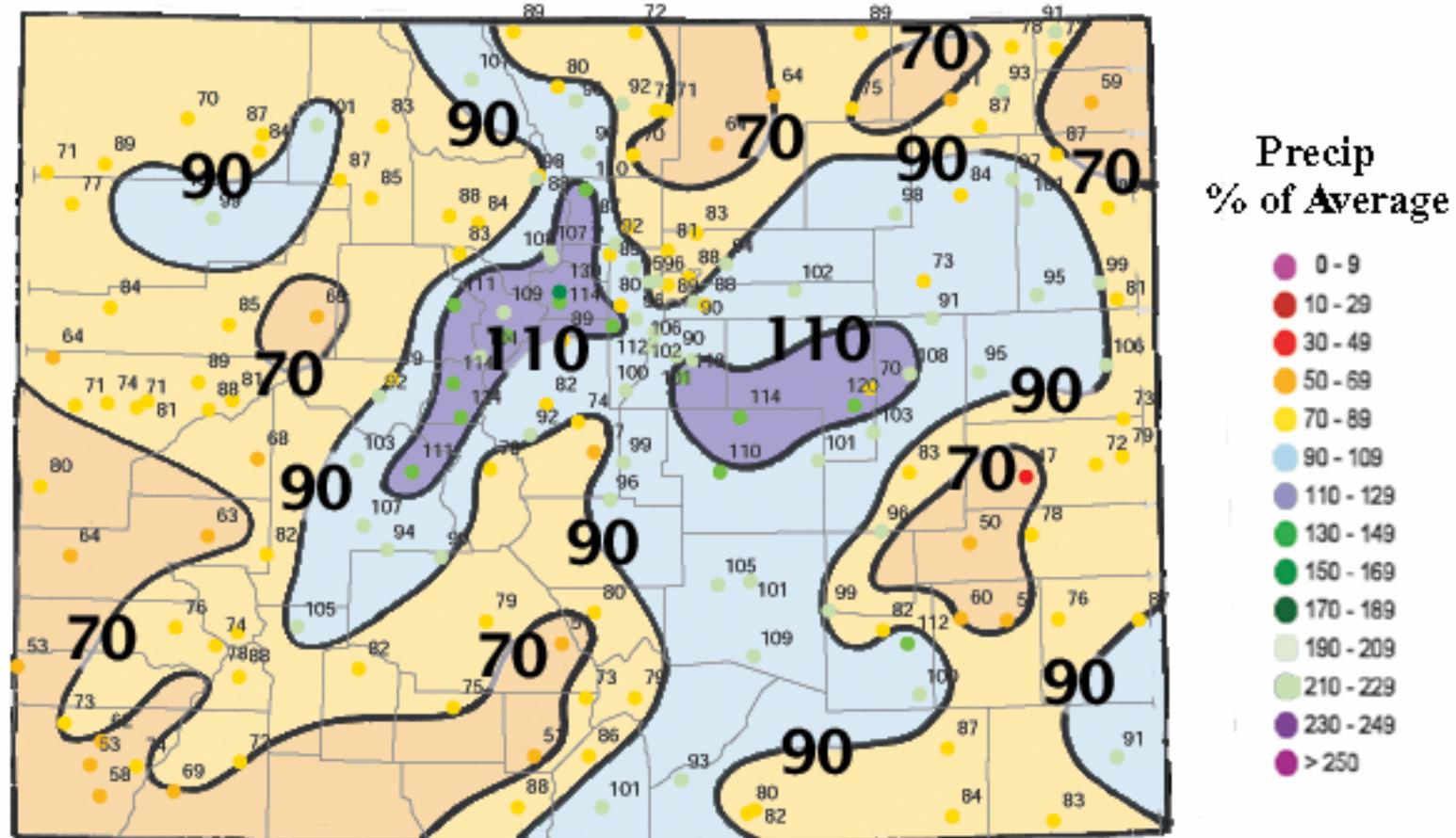


Plus (+) = Forecast to intensify next two weeks  
Minus (-) = Forecast to diminish next two weeks  
No sign = No change in drought classification forecast

• Released Thursday, Sep 30, 1999 •

# 2000 Water Year Precipitation

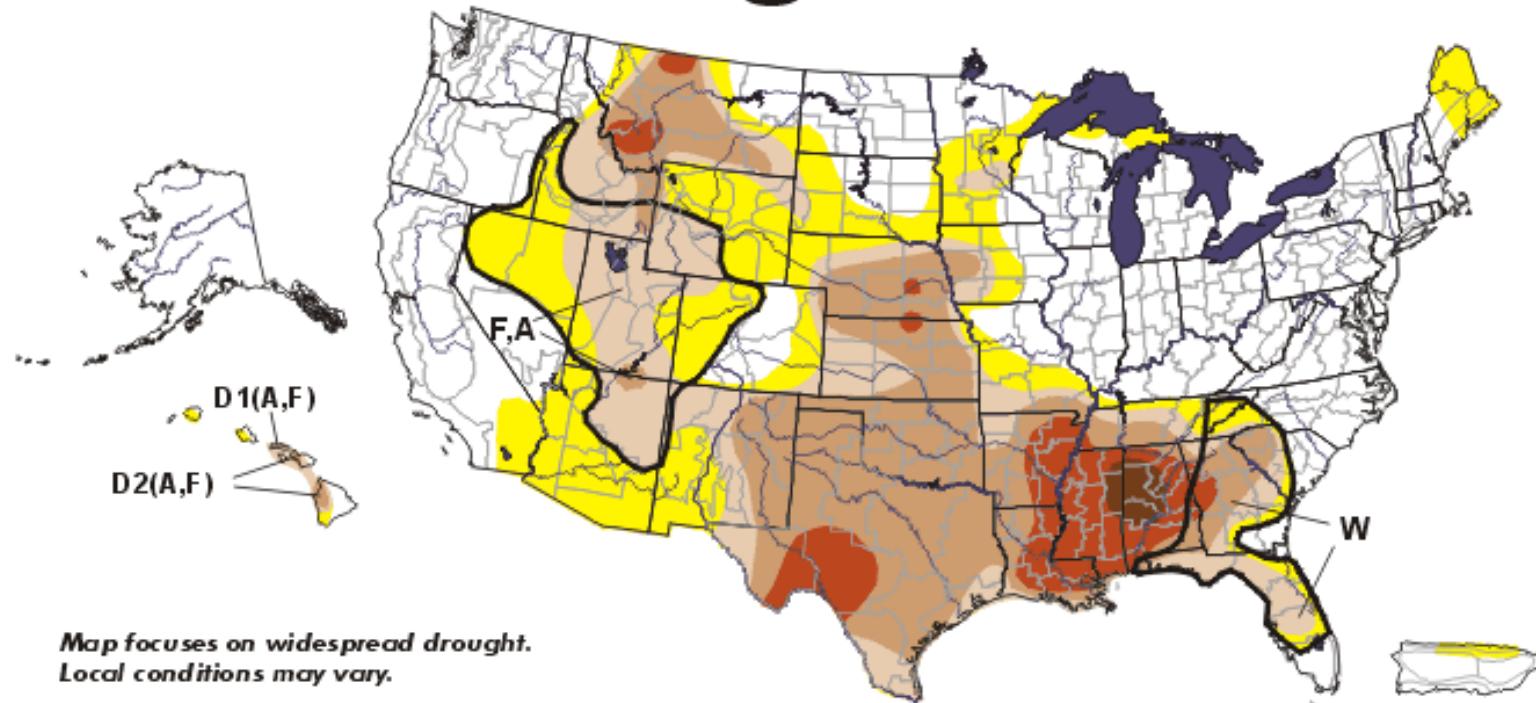
Water Year 2000  
(Oct. 1999 - Sept. 2000)  
Precipitation Percent of Average for 1961-1990 Averages



# October 2000 Drought Monitor Map

October 3, 2000 Valid 8 a.m. EDT

## U.S. Drought Monitor



Map focuses on widespread drought.  
Local conditions may vary.

- D0 Abnormally Dry
- D1 Drought-First Stage
- D2 Drought-Severe
- D3 Drought-Extreme
- D4 Drought-Exceptional
- Delineates Overlapping Areas

- Drought type: used only when impacts differ
- A = Agriculture
- W = Water
- F = Wildfire danger



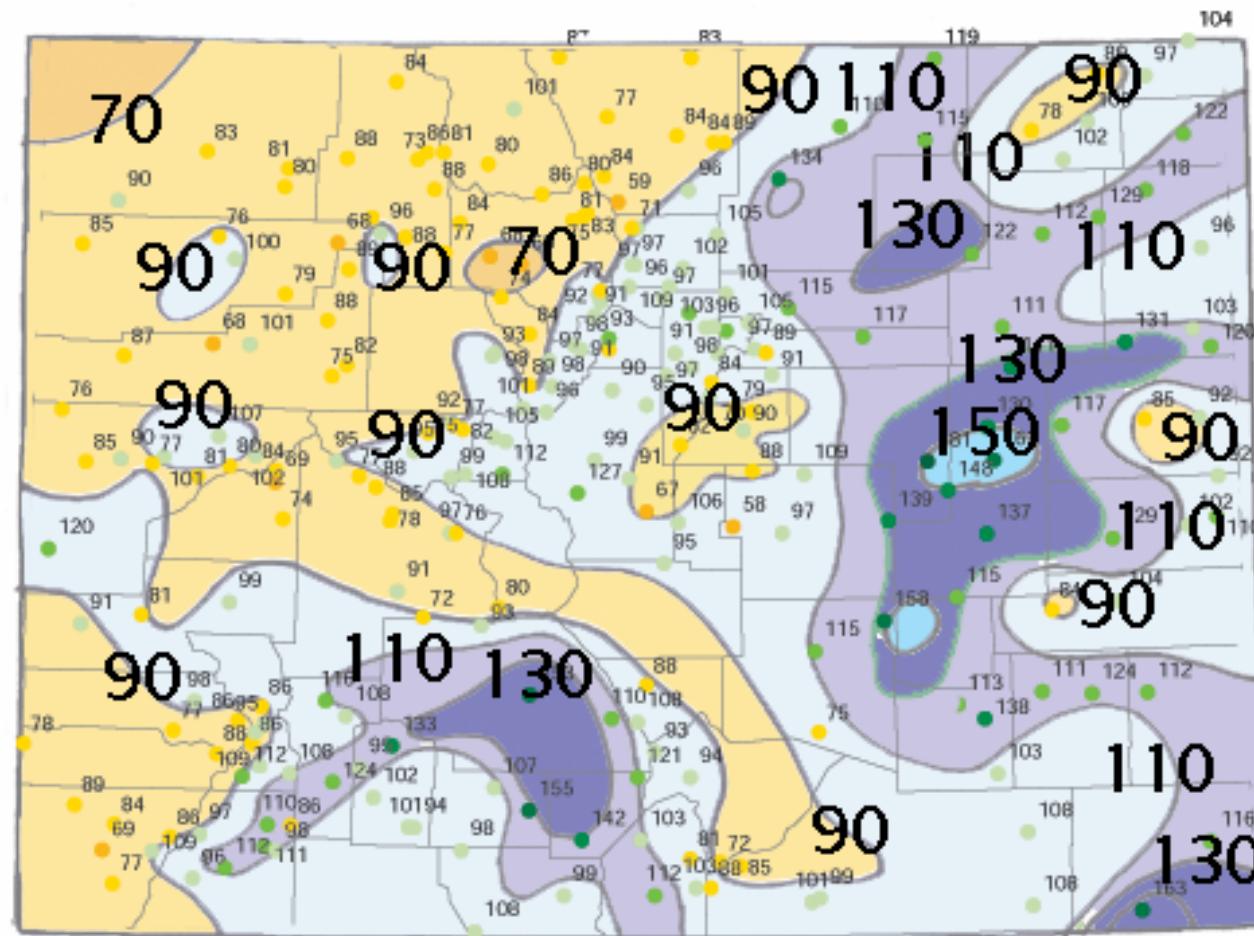
See accompanying texts summary for forecast statements

<http://enso.unl.edu/monitor/monitor.html>

• Released Thursday, Oct. 5, 2000 •

# 2001 Water Year Precipitation

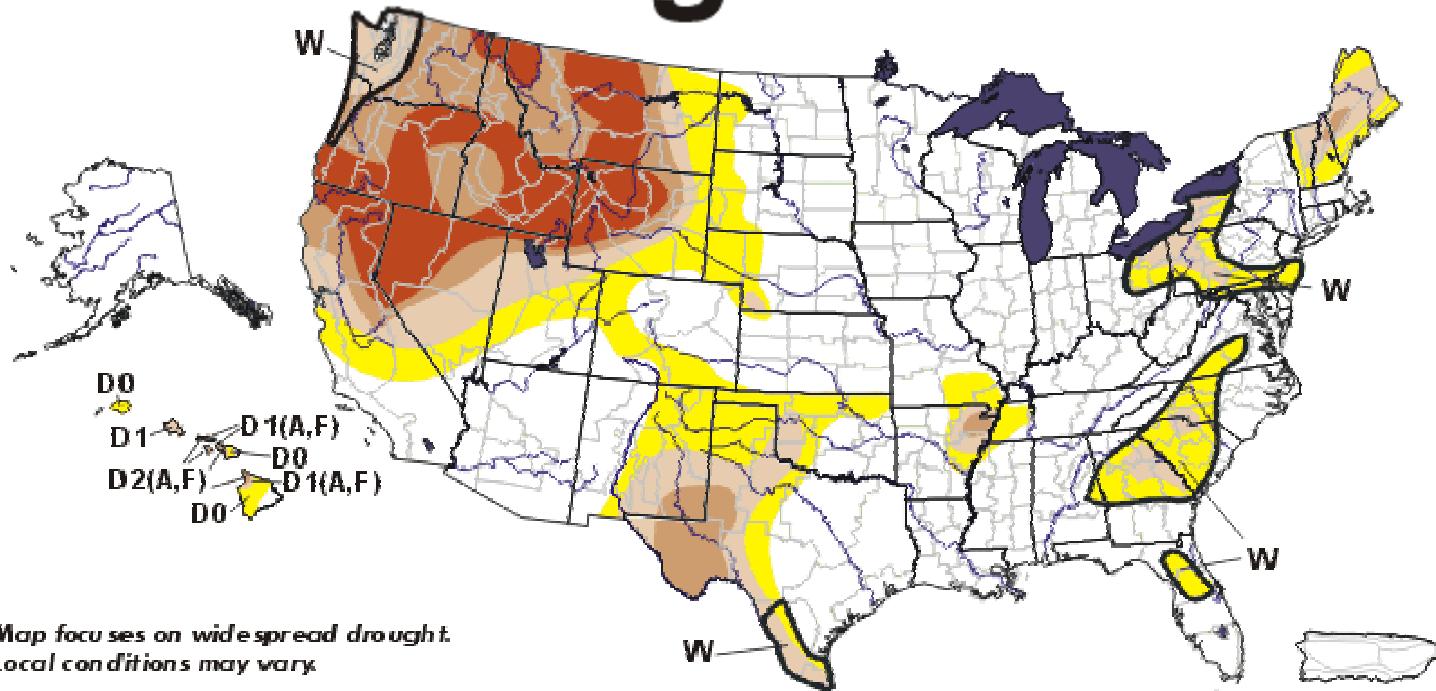
Water Year 2001  
(Oct. 2000 - Sept. 2001)  
Precipitation Percent of Average for 1961-1990 Averages



# October 2001 Drought Monitor Map

October 2, 2001 Valid 8 am. EDT

## U.S. Drought Monitor



Map focuses on widespread drought.  
Local conditions may vary.

- Yellow: D0 Abnormally Dry
- Brown shades: D1 Drought-Moderate, D2 Drought-Severe, D3 Drought-Extreme, D4 Drought-Exceptional
- Lightest brown: Delineates Overlapping Areas

- Drought Impact Types:  
A = Agriculture  
W = Water (Hydrological)  
F = Fire danger (Wildfires)  
(No type = All 3 impacts)

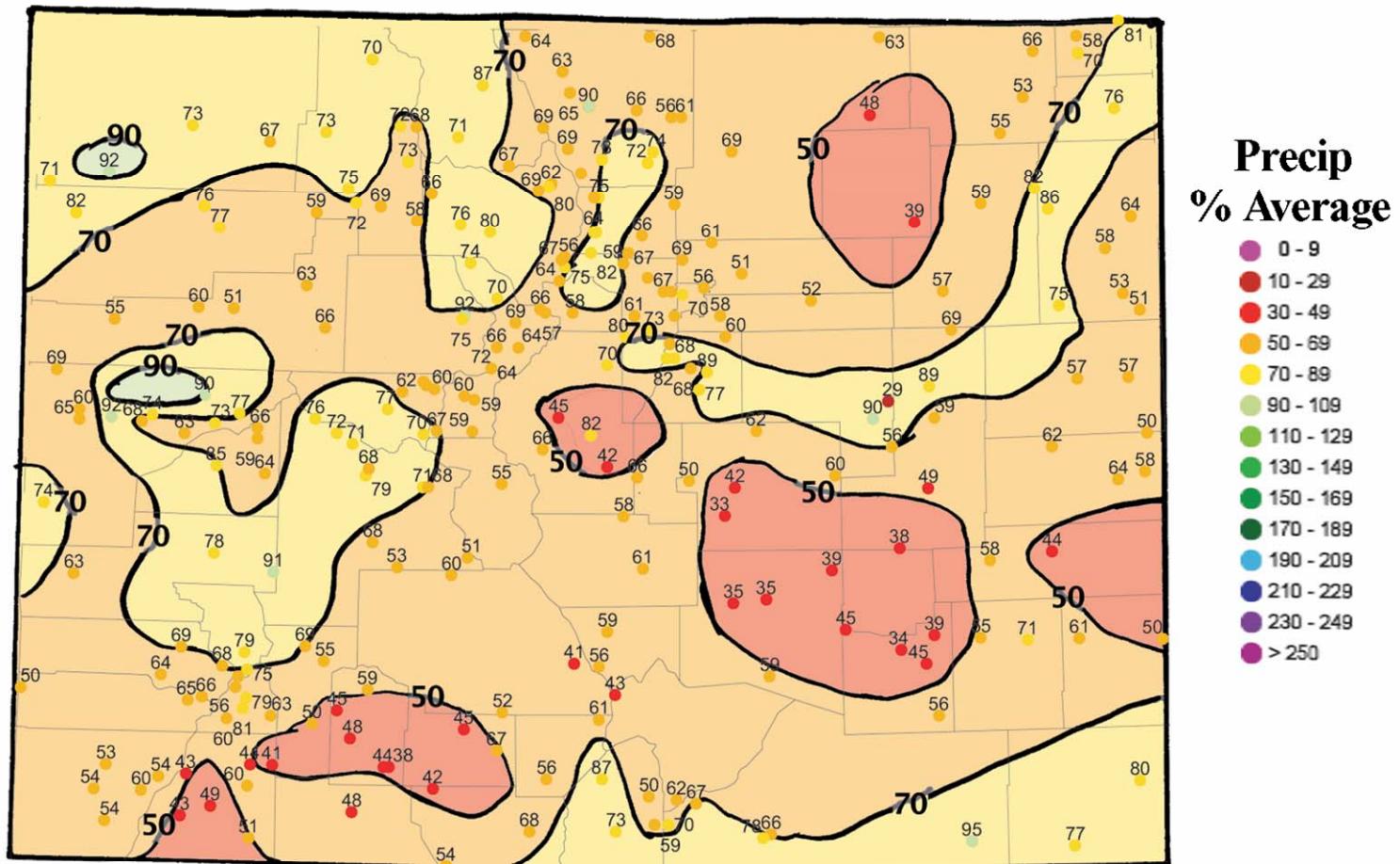
See accompanying text summary for forecast statements  
<http://enso.unl.edu/monitor/monitor.html>



• Released Thursday, October 4, 2001 •  
Author: Douglas Le Comte, NOAA/CPC

# 2002 Water Year Precipitation

Water Year 2002  
(Oct. 2001 - Sept. 2002)  
Precipitation Percent of Average for 1961-1990 Averages

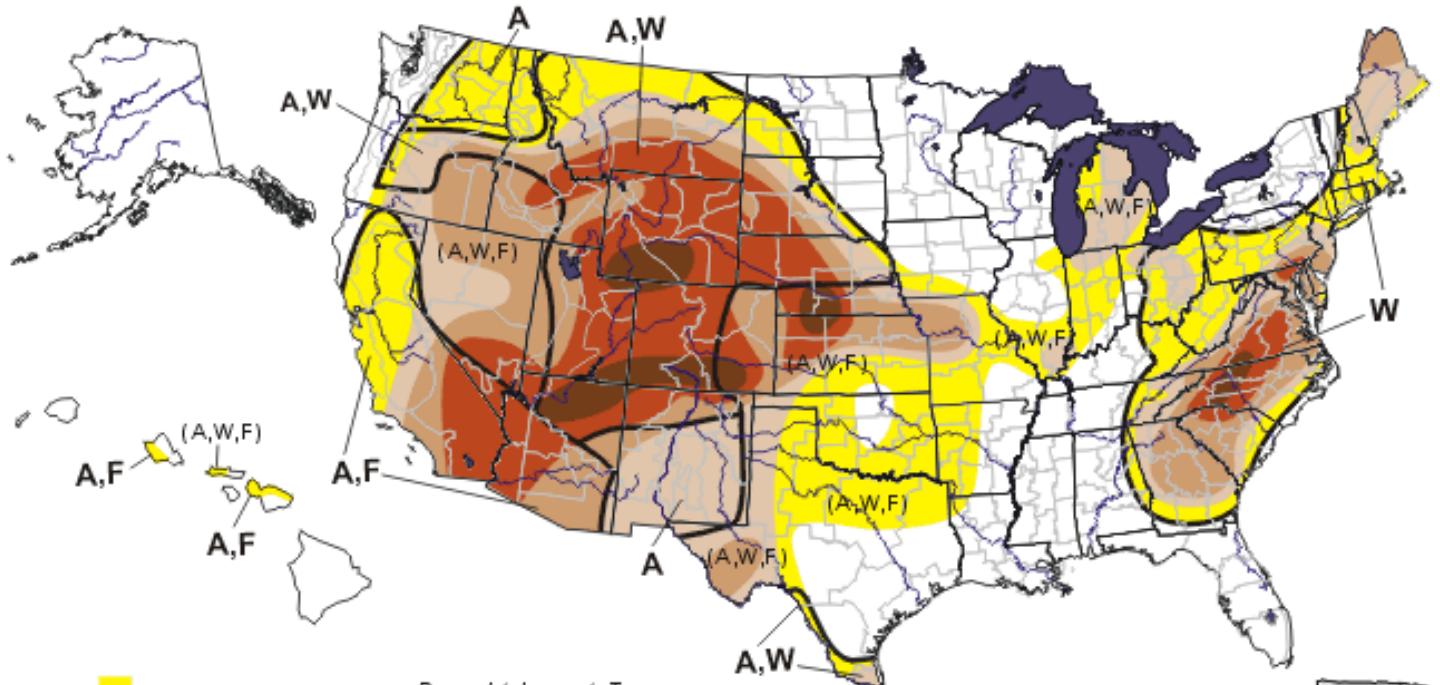


# October 2002 Drought Monitor Map

## U.S. Drought Monitor

October 1, 2002

Valid 8 a.m. EDT



- DO Abnormally Dry
- D1 Drought—Moderate
- D2 Drought—Severe
- D3 Drought—Extreme
- D4 Drought—Exceptional

- Drought Impact Types:*
- A = Agriculture
  - W = Water (Hydrological)
  - F = Fire danger (Wildfires)
- Delineates dominant impacts  
(No type = All 3 impacts)

The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, October 3, 2002

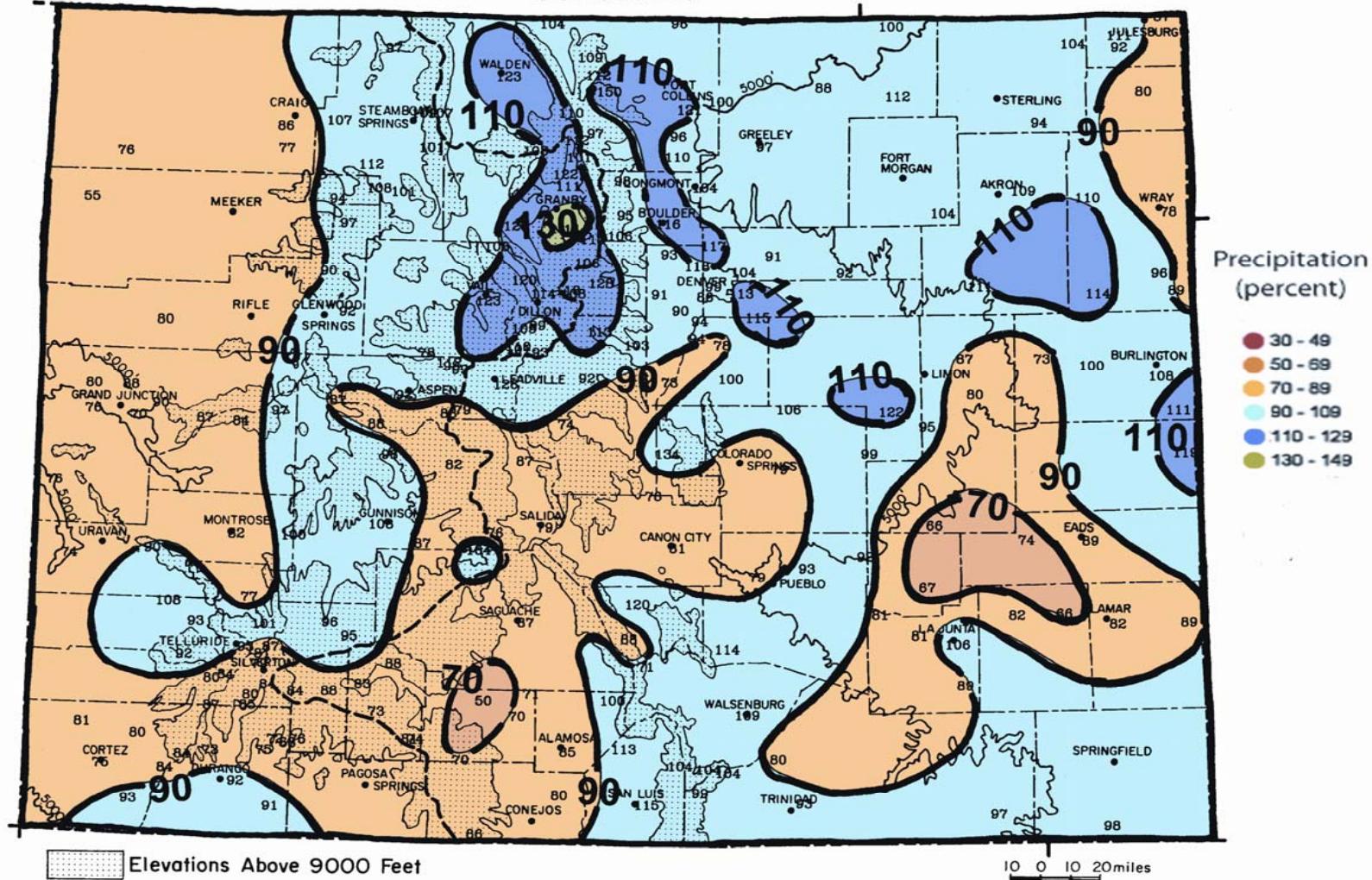
Author: Rich Tinker, CPC/NCEP/NWS/NOAA

# 2003 Water Year Precipitation

## Water Year 2003

October 2002 - September 2003 precipitation  
as a percent of the 1971-2000 average.

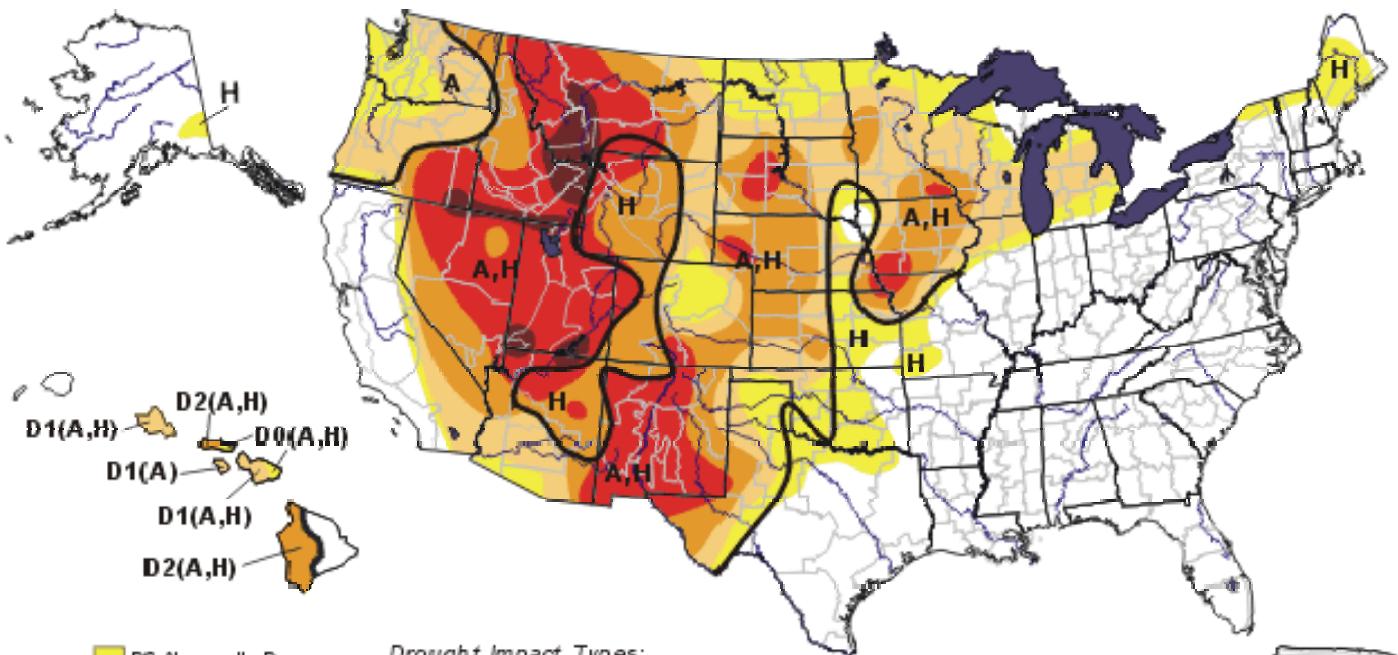
### COLORADO



# September 2003 Drought Monitor Map

## U.S. Drought Monitor

September 30, 2003  
Valid 8 a.m. EDT

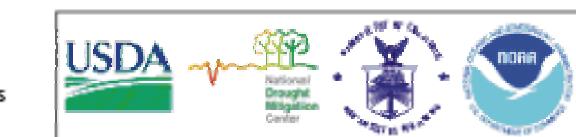


- D0 Abnormally Dry
- D1 Drought—Moderate
- D2 Drought—Severe
- D3 Drought—Extreme
- D4 Drought—Exceptional

*Drought Impact Types:*  
A= Agricultural (crops, pastures,  
grasslands)  
H= Hydrological (water)  
No type = both impacts  
Delineates dominant impacts

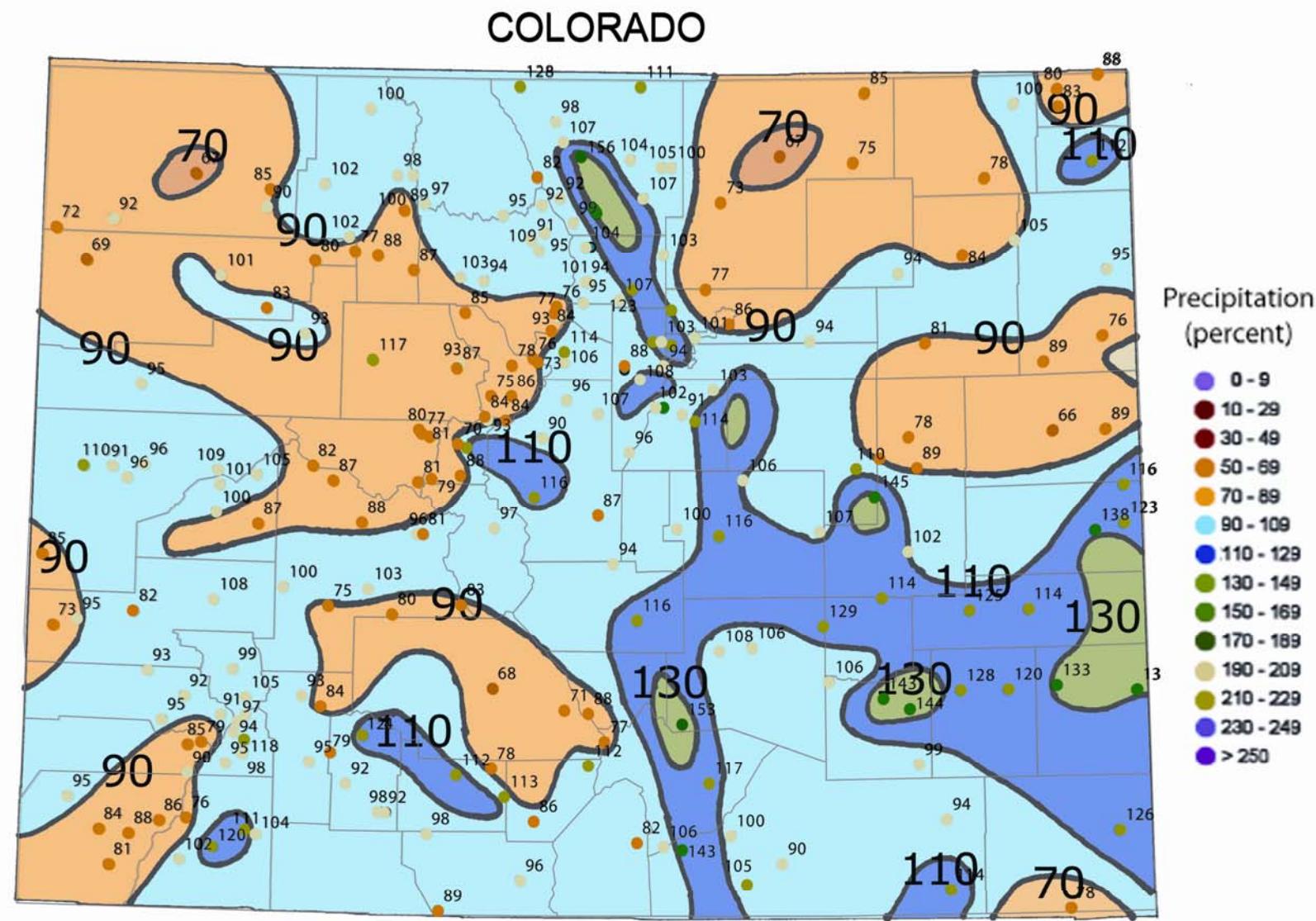
The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, October 2, 2003  
Author: Candace Tankersley/Scott Stephens, NOAA/NCDC

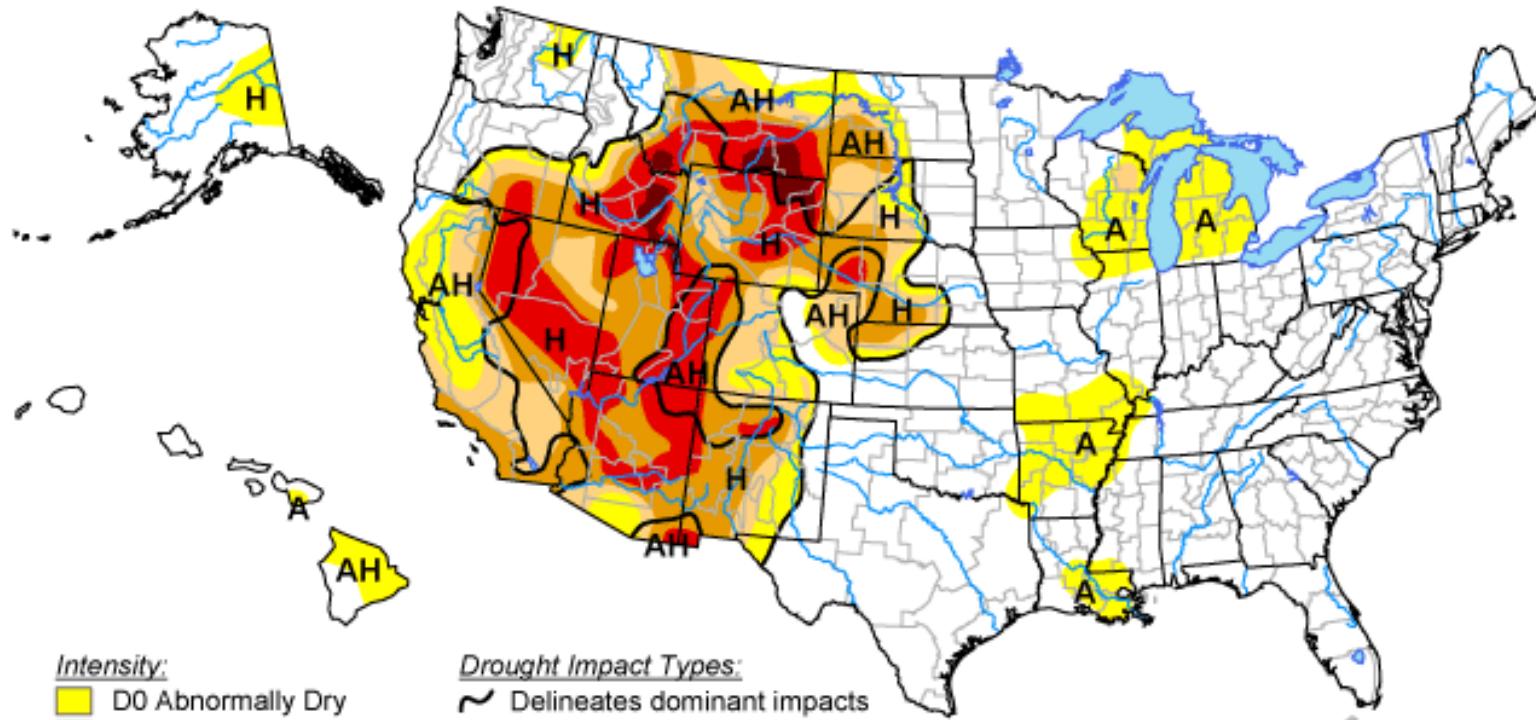
# 2004 Water Year Precipitation



# September 2004 Drought Monitor Map

## U.S. Drought Monitor

September 28, 2004  
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)
- (No type = Both impacts)

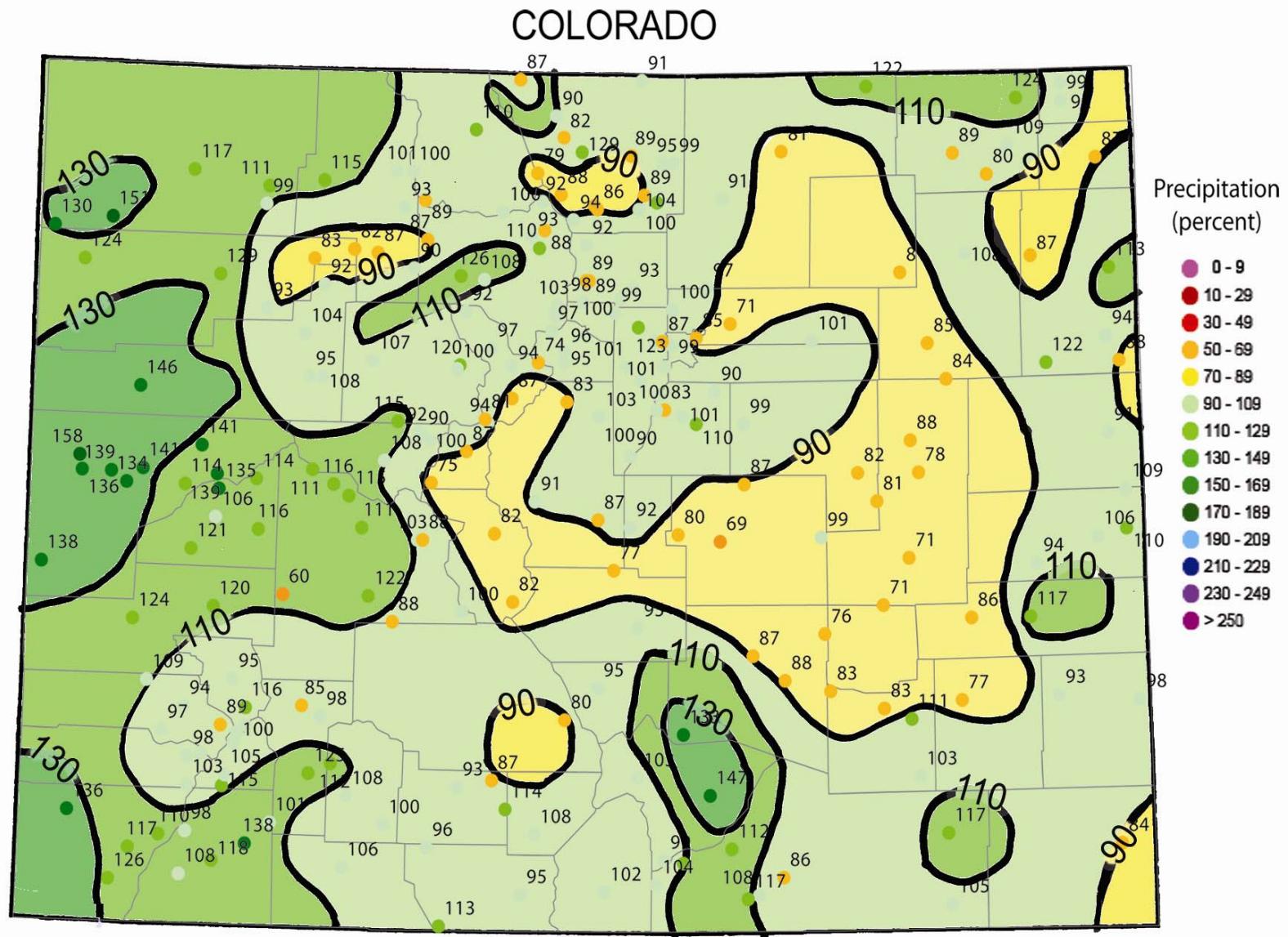
The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, September 30, 2004  
Author: Brad Rippey, U.S. Department of Agriculture

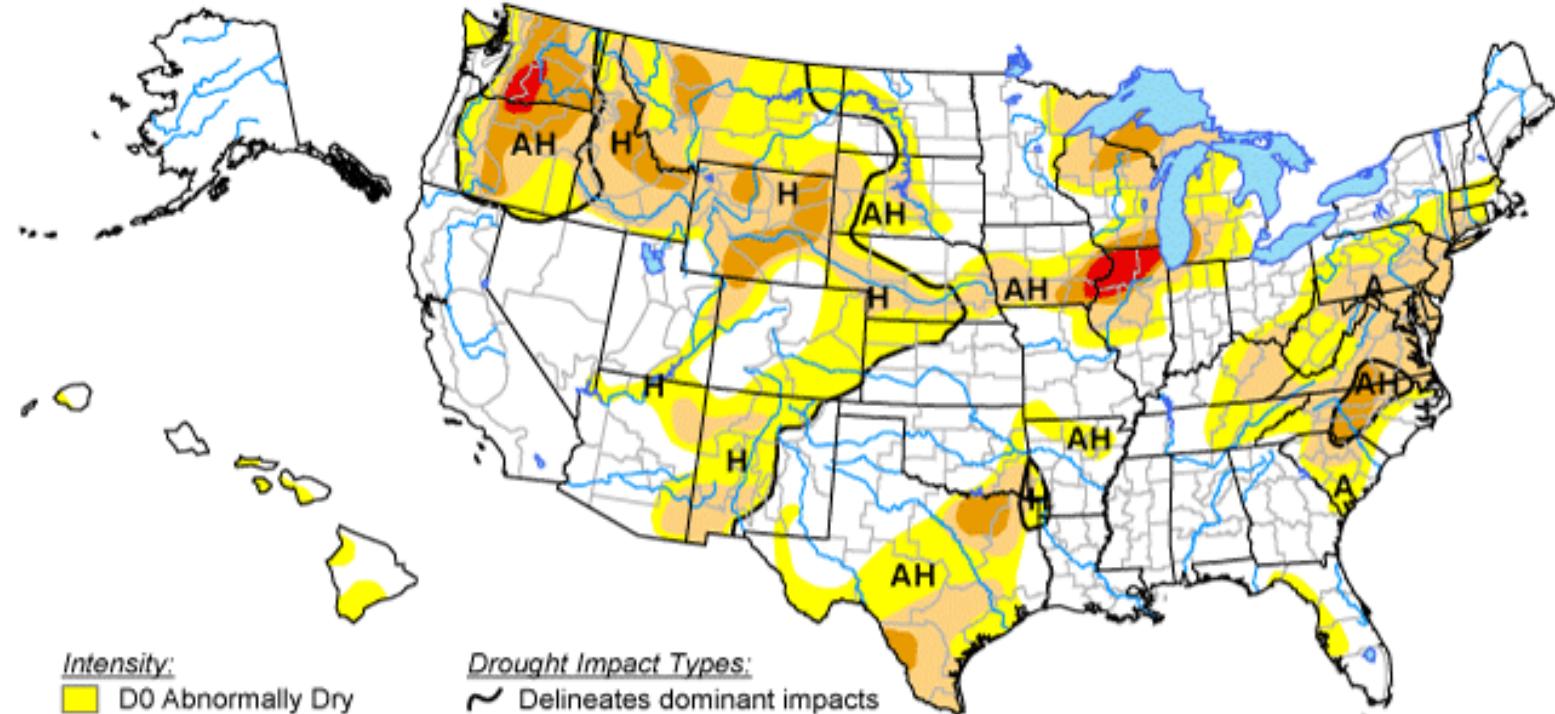
# 2005 Water Year Precipitation



# October 2005 Drought Monitor Map

## U.S. Drought Monitor

October 4, 2005  
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)  
(No type = Both impacts)

The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

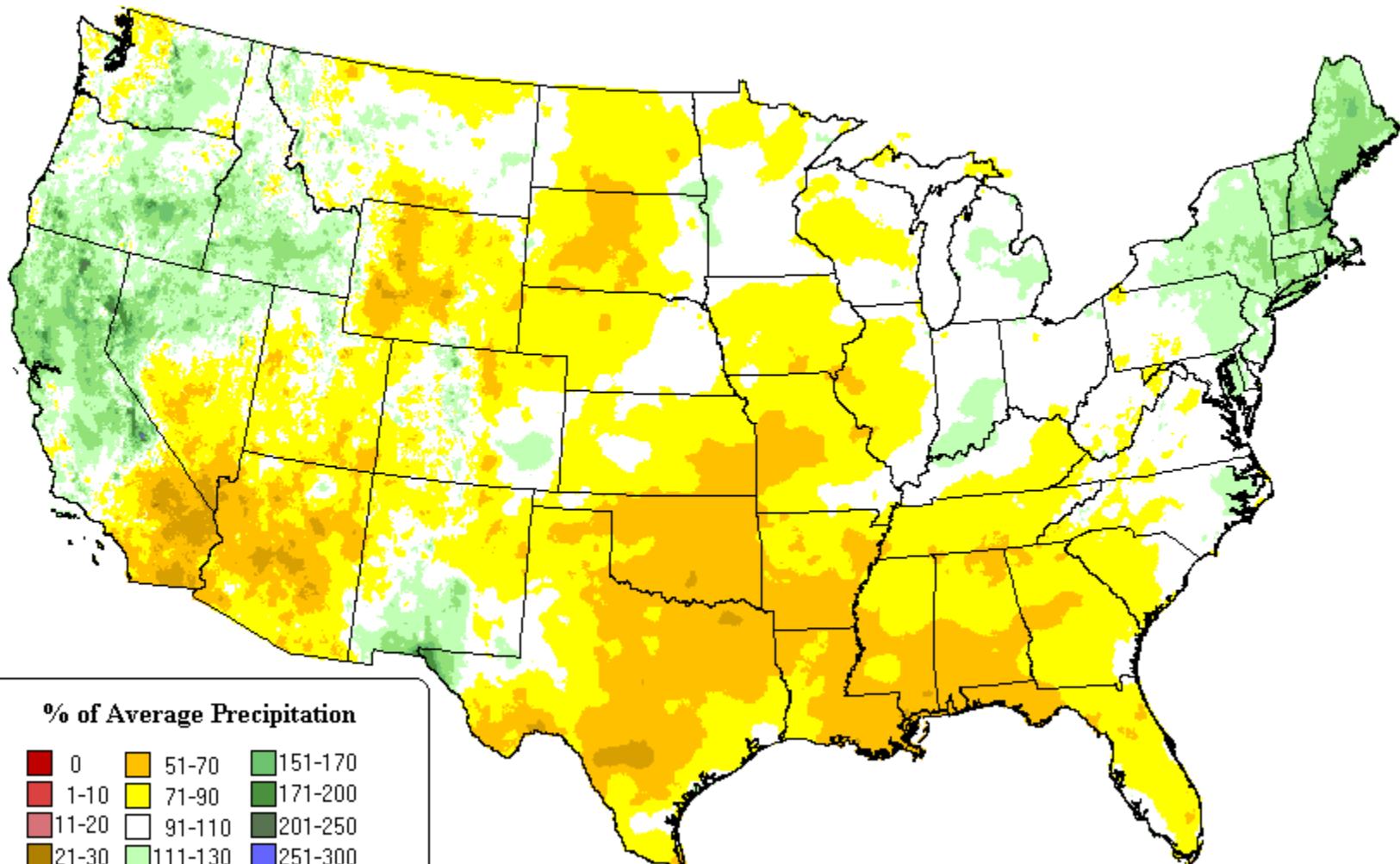
<http://drought.unl.edu/dm>



Released Thursday, October 6, 2005  
Author: Rich Tinker, CPC/NCEP/NWS/NOAA

# Water Year 2006 precipitation as a percent of average (Prism)

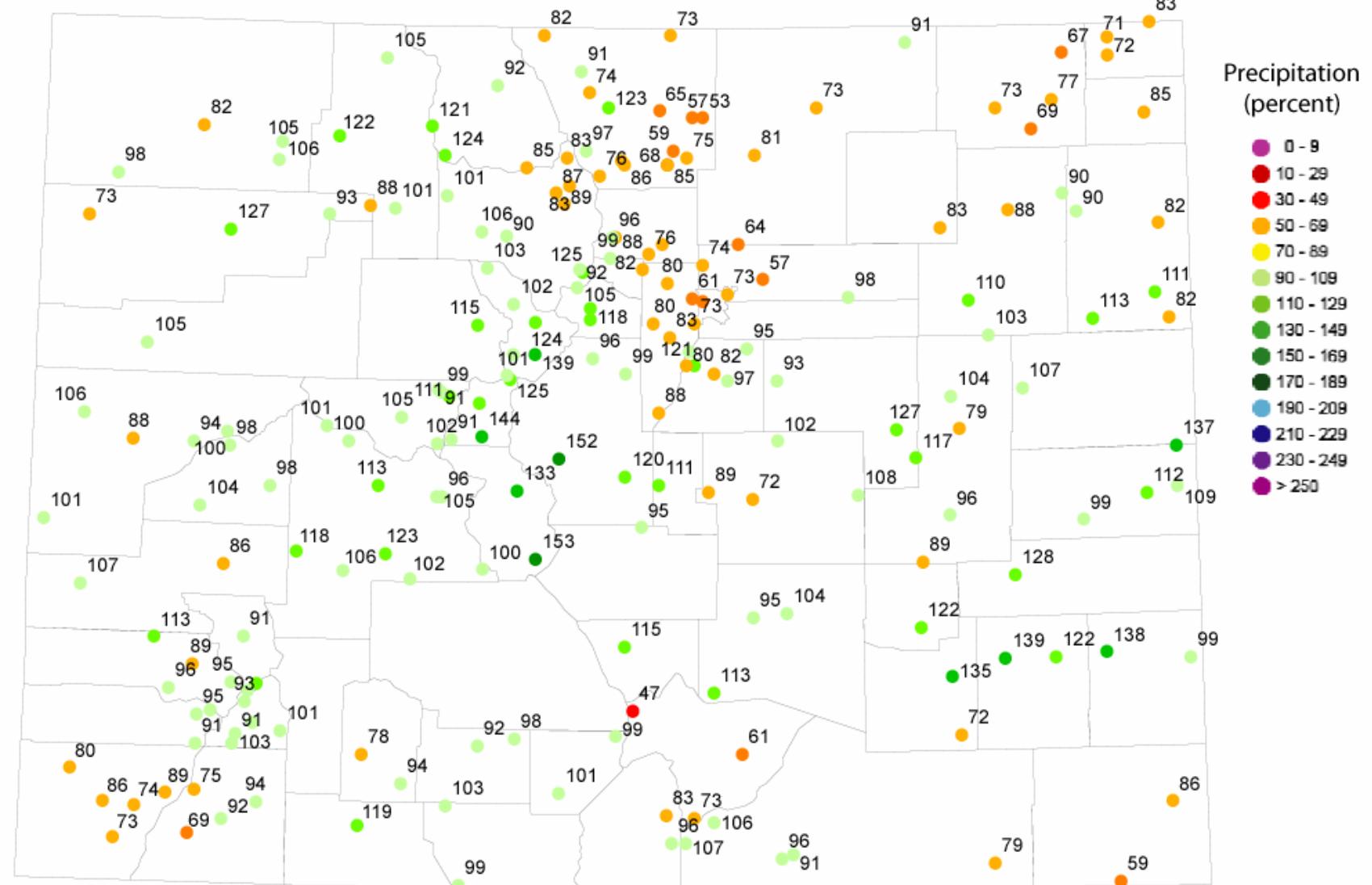
12-month Percent of Average Precipitation: Sep 2006  
Provisional Data



Copyright (c) 2006, PRISM Group, Oregon State University  
<http://www.ocs.oregonstate.edu/prism> – Map created Oct 12 2006

# Water Year 2006 precipitation as a percent of the 1971-2000 average

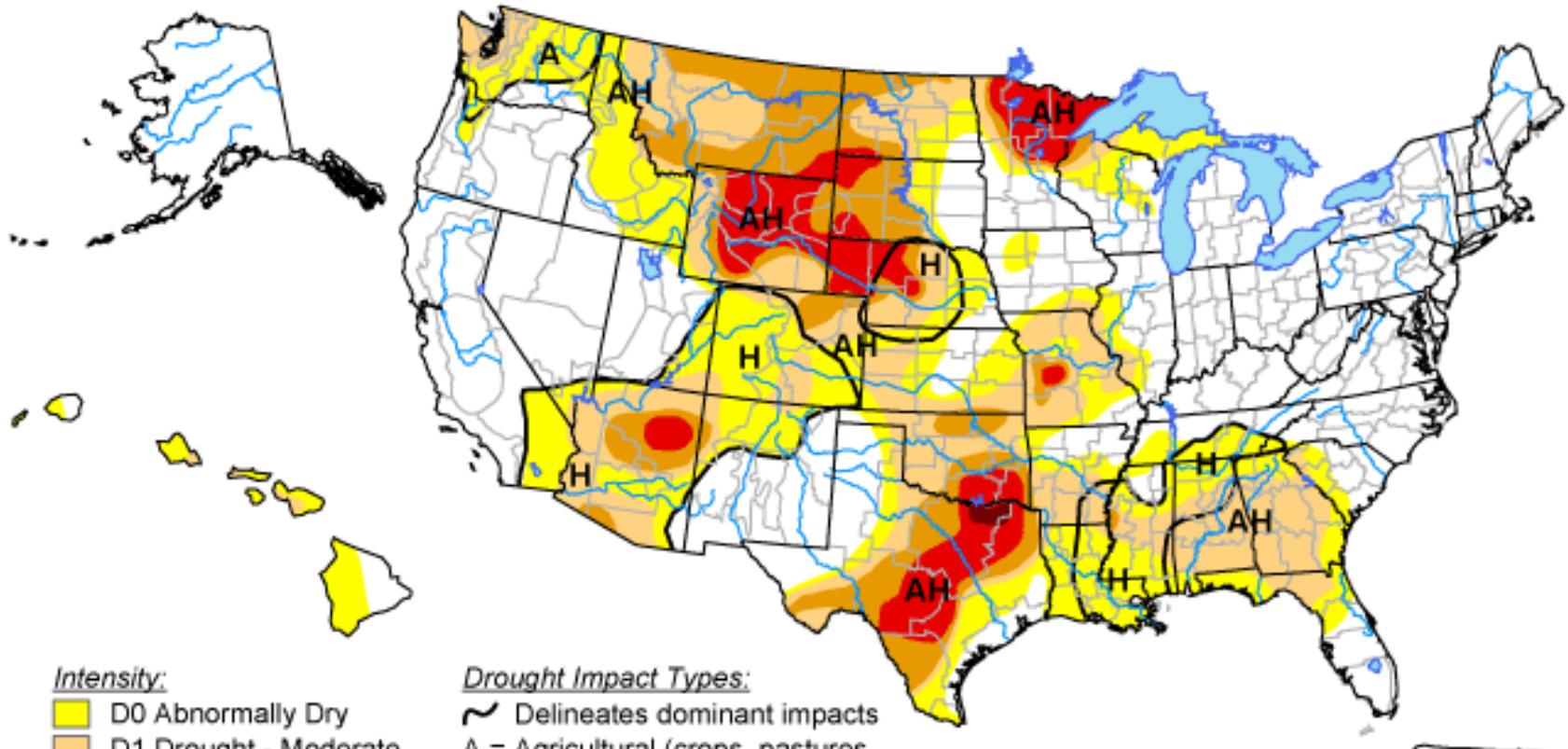
## COLORADO



Water Year 2006 (October 2005 through September 2006) precipitation as a percent of the 1971-2000 average.

# U.S. Drought Monitor

October 3, 2006  
Valid 8 a.m. EDT



Intensity:

- [Yellow square] D0 Abnormally Dry
- [Light Orange square] D1 Drought - Moderate
- [Medium Orange square] D2 Drought - Severe
- [Red square] D3 Drought - Extreme
- [Dark Red square] D4 Drought - Exceptional

Drought Impact Types:

- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions.  
Local conditions may vary. See accompanying text summary  
for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, October 5, 2006

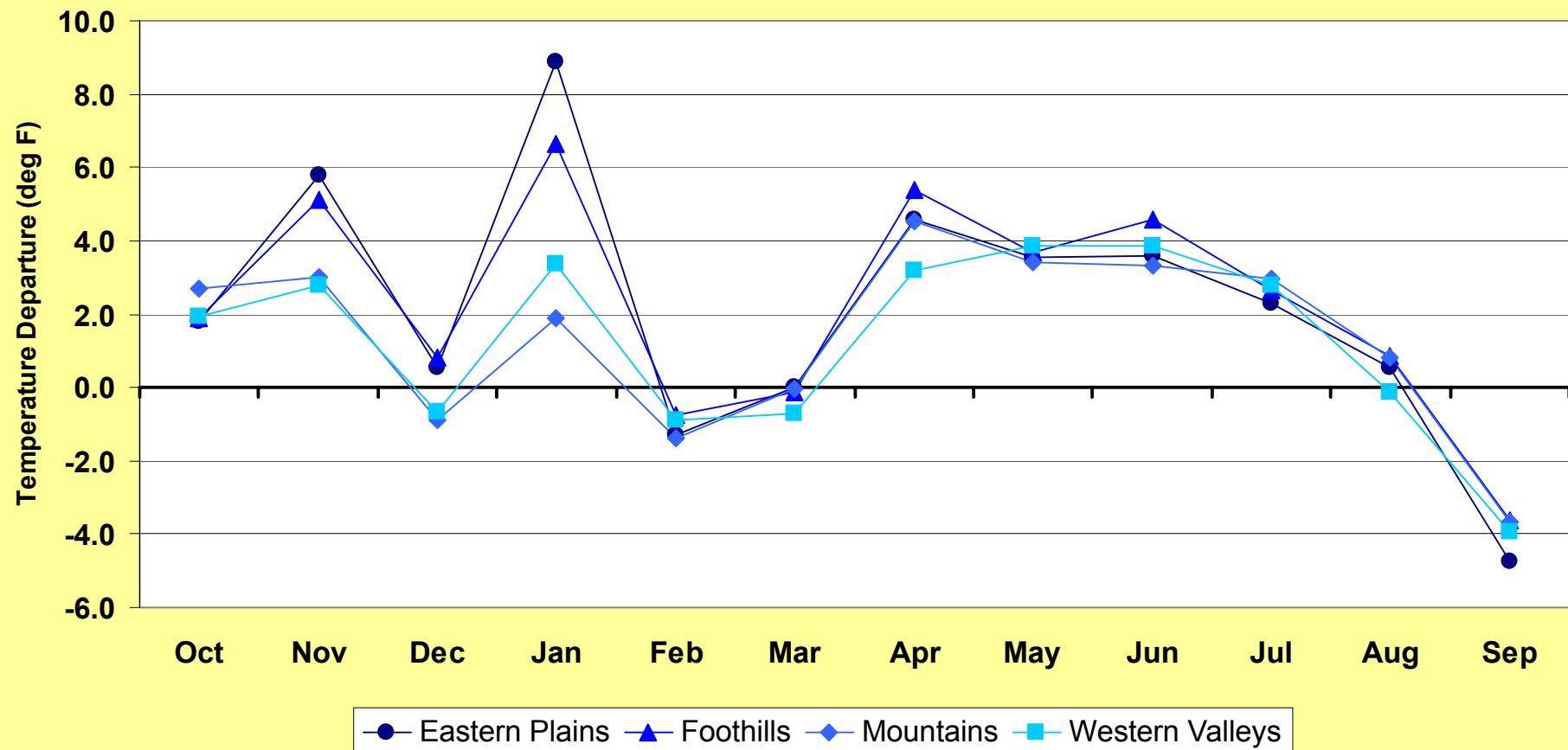
Author: Rich Tinker, Climate Prediction Center, NOAA

# A closer look at the past year

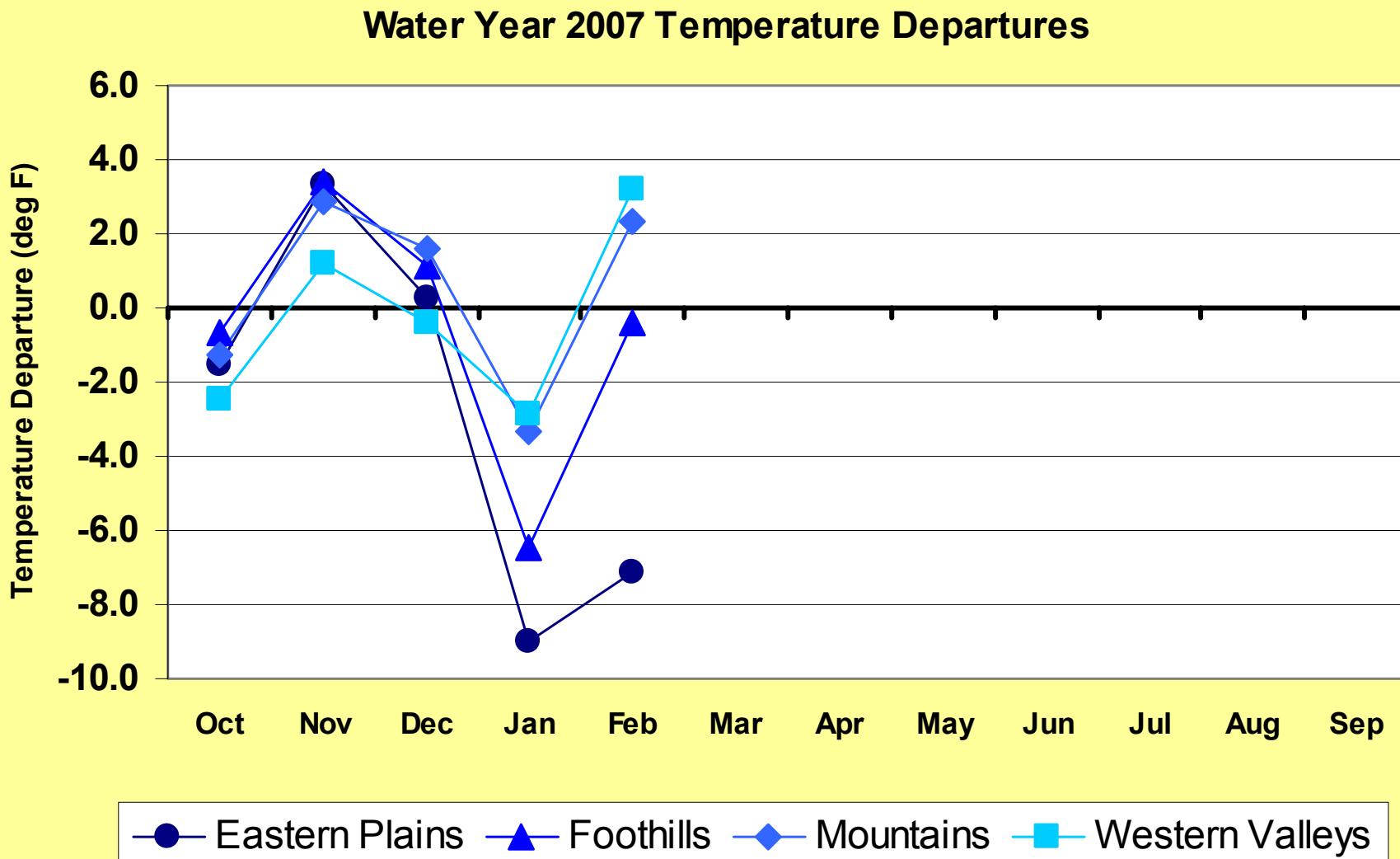


# WY2006 Temperature Departures

Temperature Departures for Water Year 2006

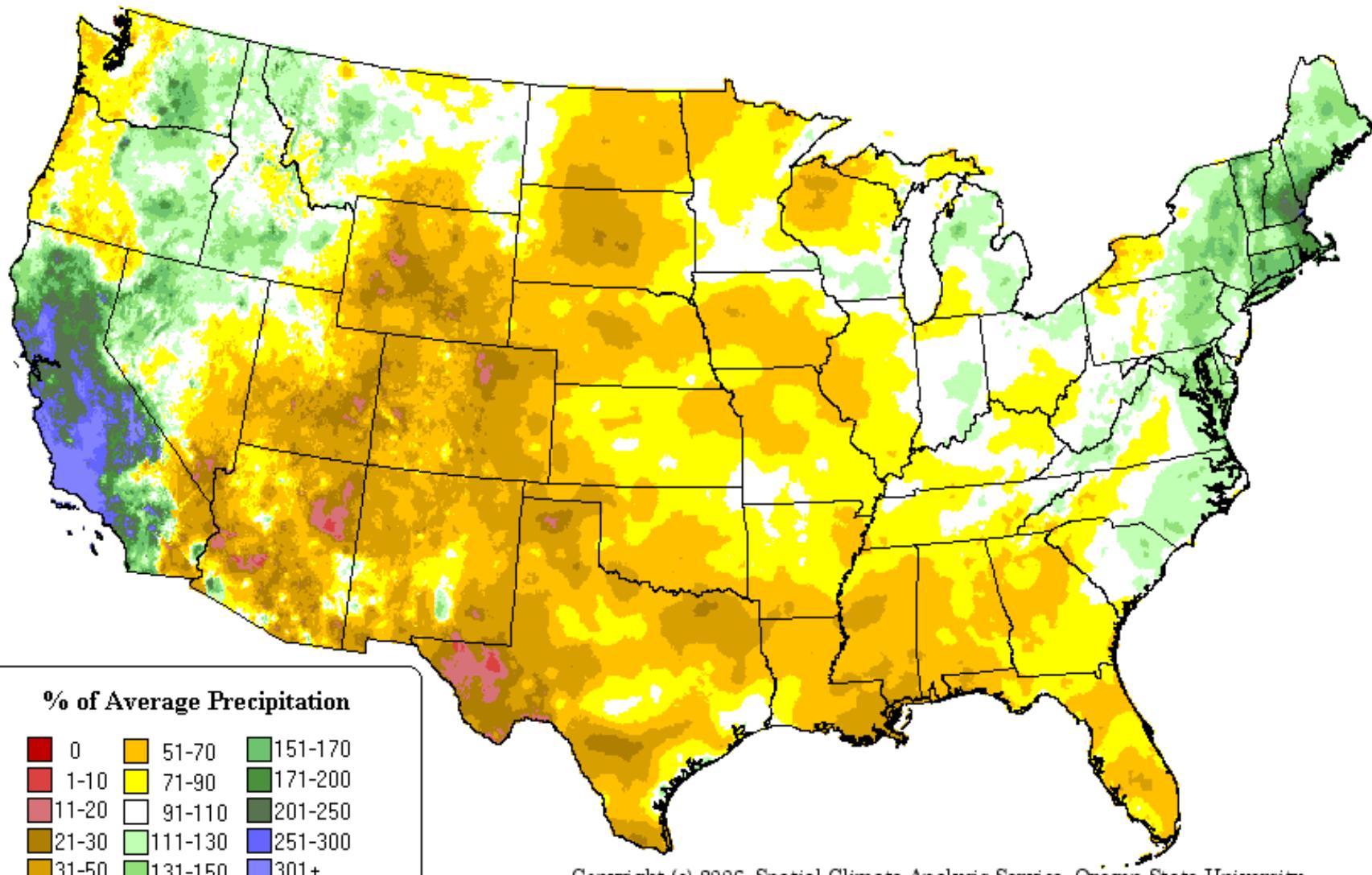


# WY2007 Temperature Departures



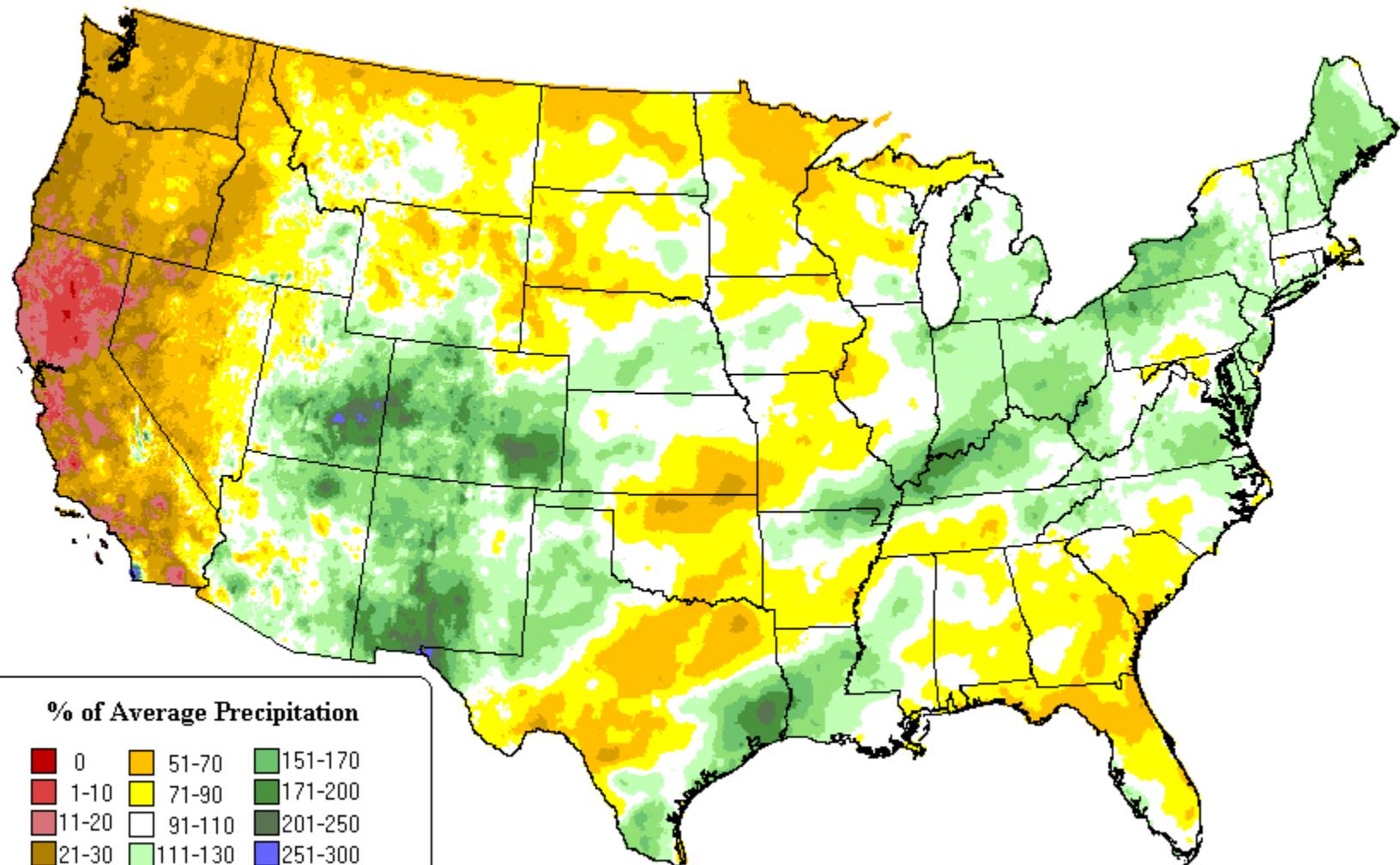
# April-June 2006 Drought

**3-month Percent of Average Precipitation: Jun 2006**  
Provisional Data



# July-October 2006

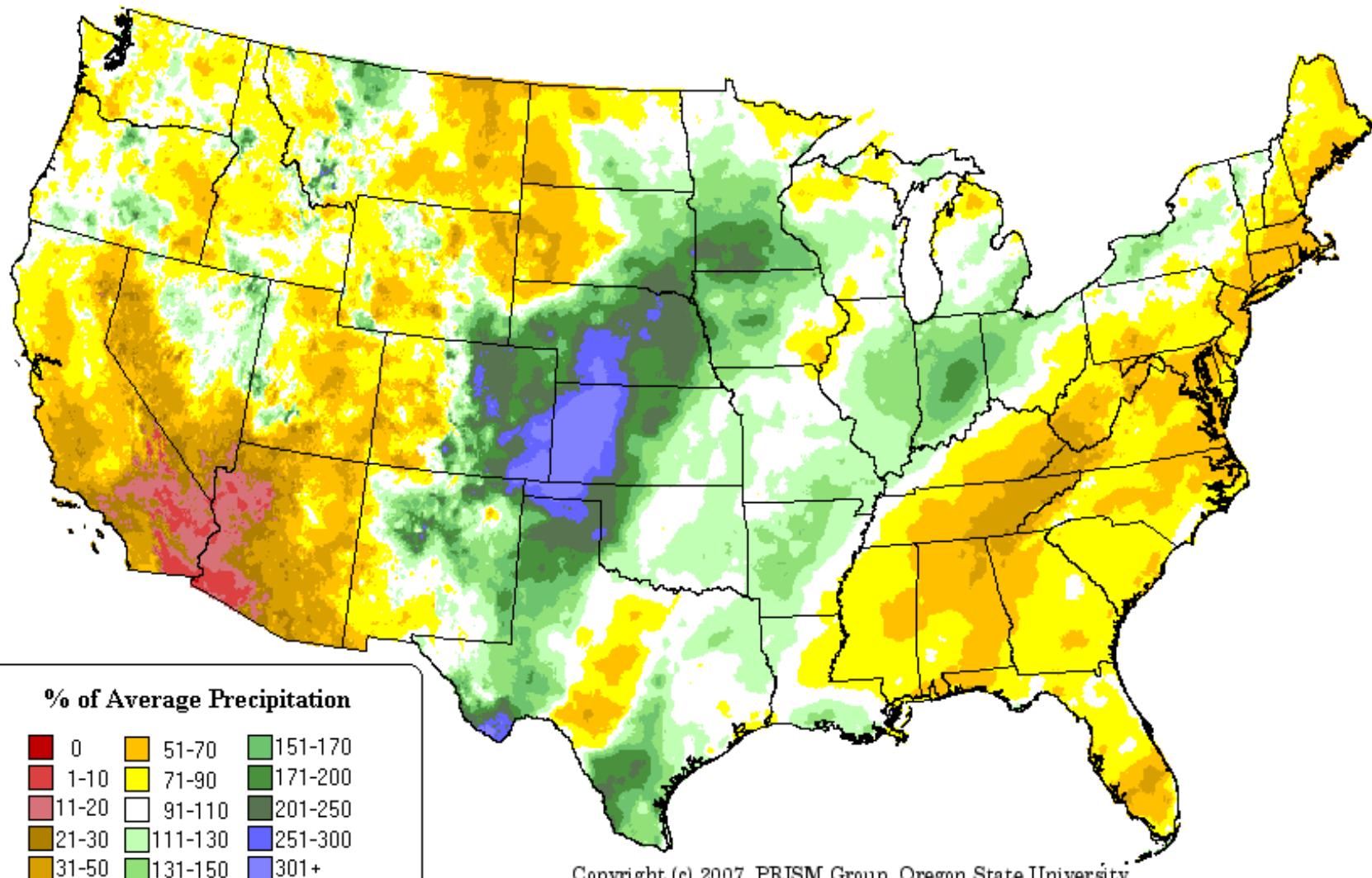
4-month Percent of Average Precipitation: Oct 2006  
Provisional Data



Copyright (c) 2006, PRISM Group, Oregon State University  
<http://www.ocs.oregonstate.edu/prism> – Map created Nov 28 2006

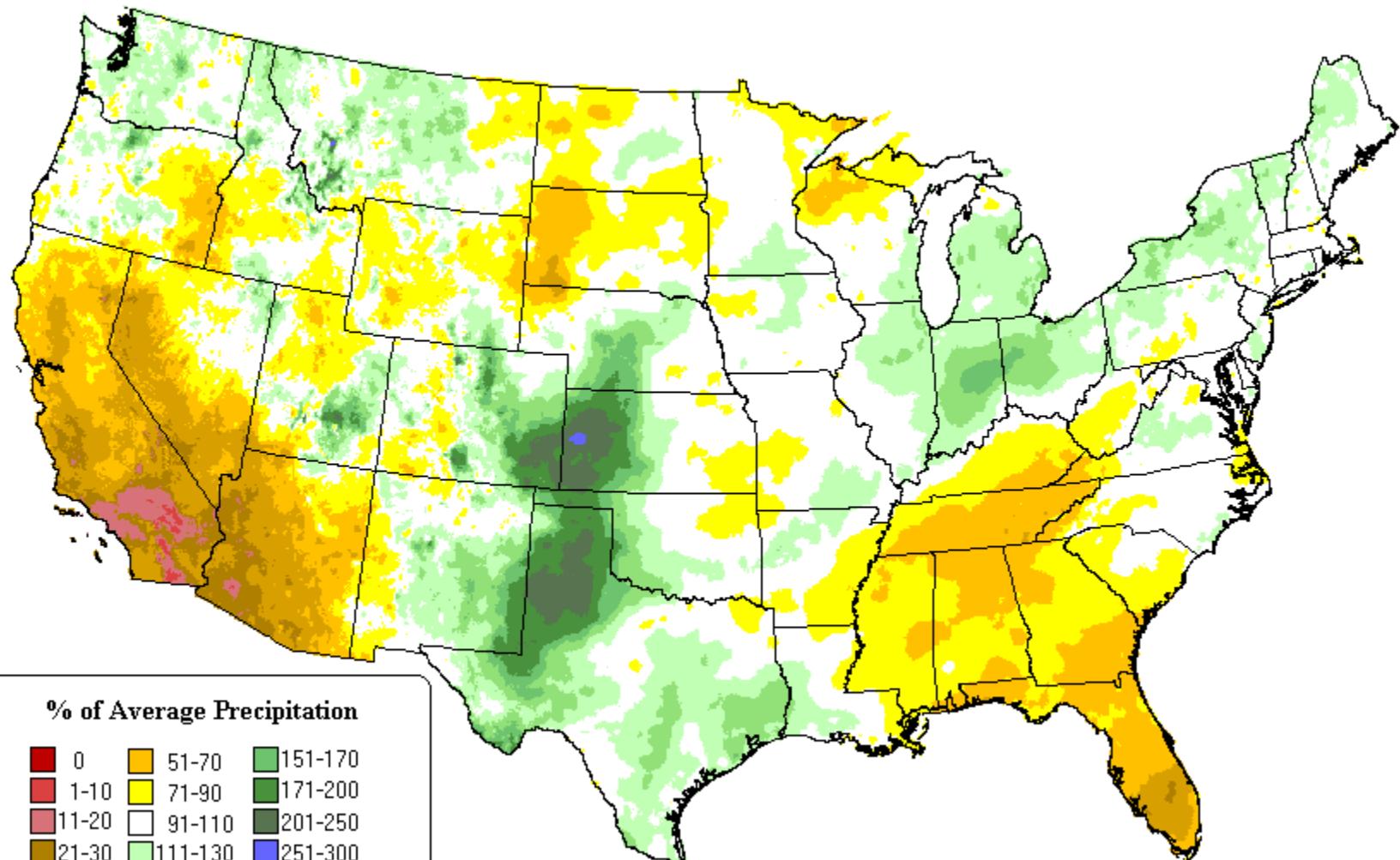
# Winter Precipitation (Dec-Feb)

**3-month Percent of Average Precipitation: Feb 2007**  
Provisional Data



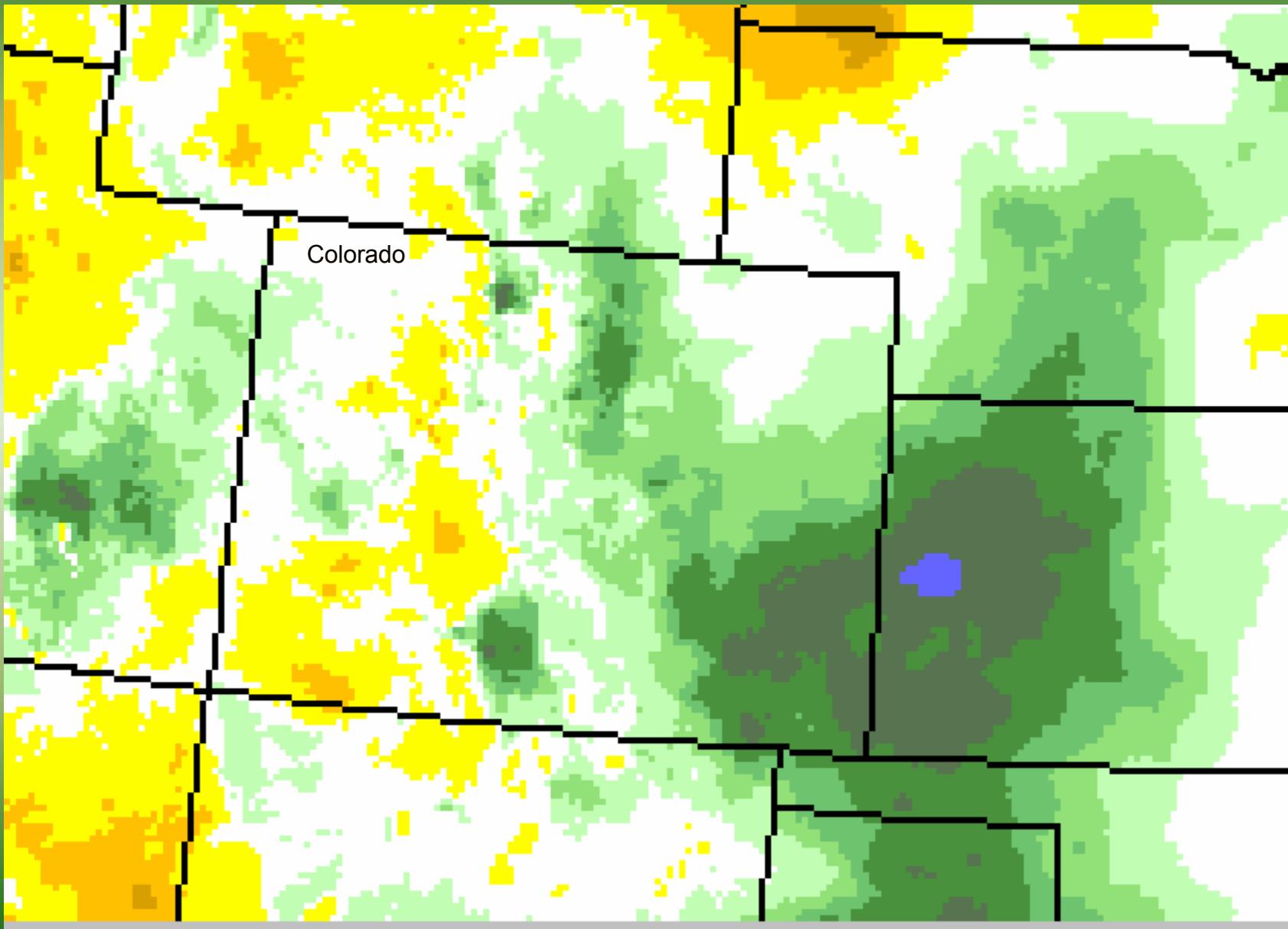
# Water Year 2007 (October – March) to Date

6-month Percent of Average Precipitation: Mar 2007  
Provisional Data

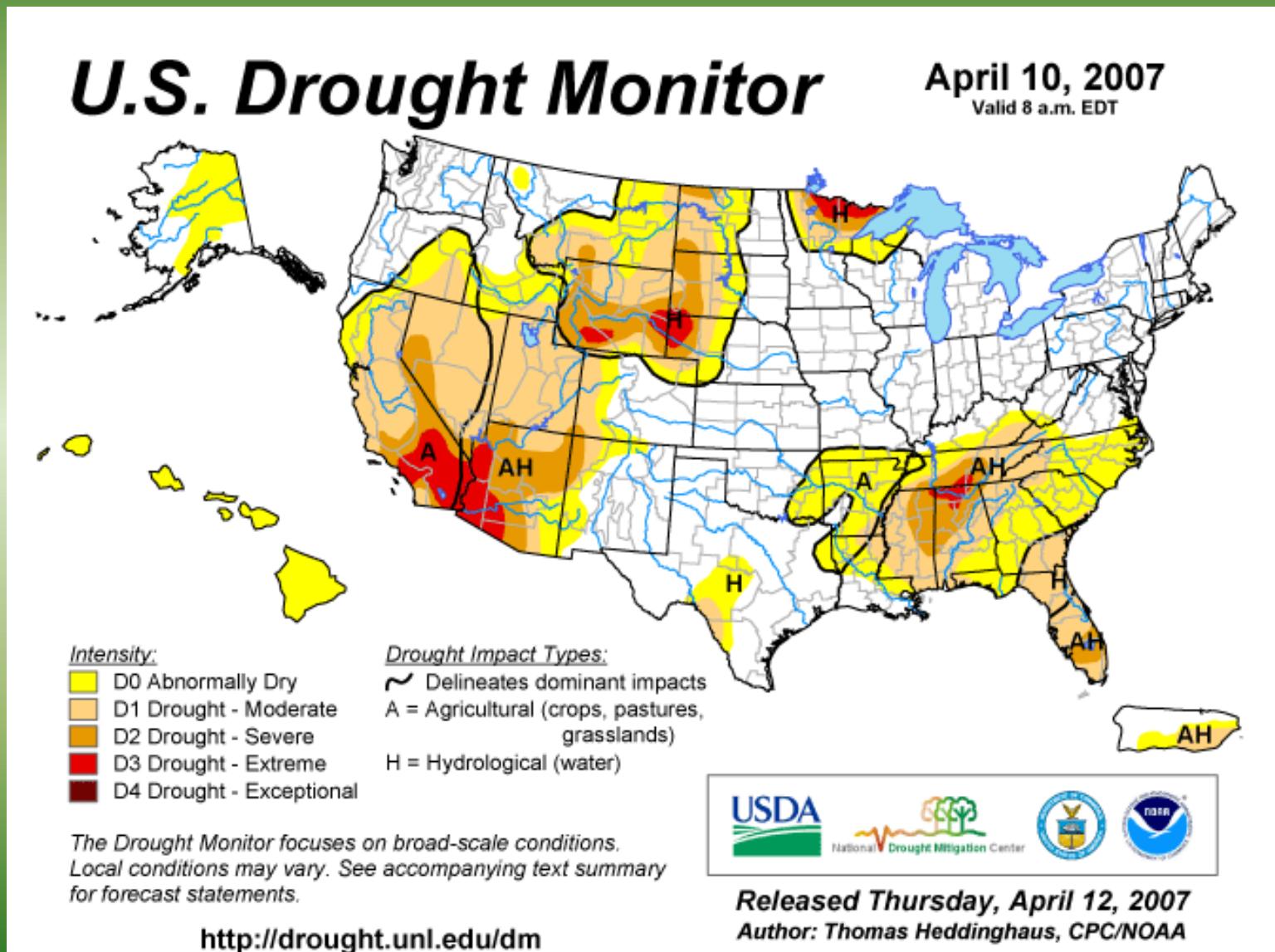


Copyright (c) 2007, PRISM Group, Oregon State University  
<http://www.ocs.oregonstate.edu/prism> – Map created Apr 10 2007

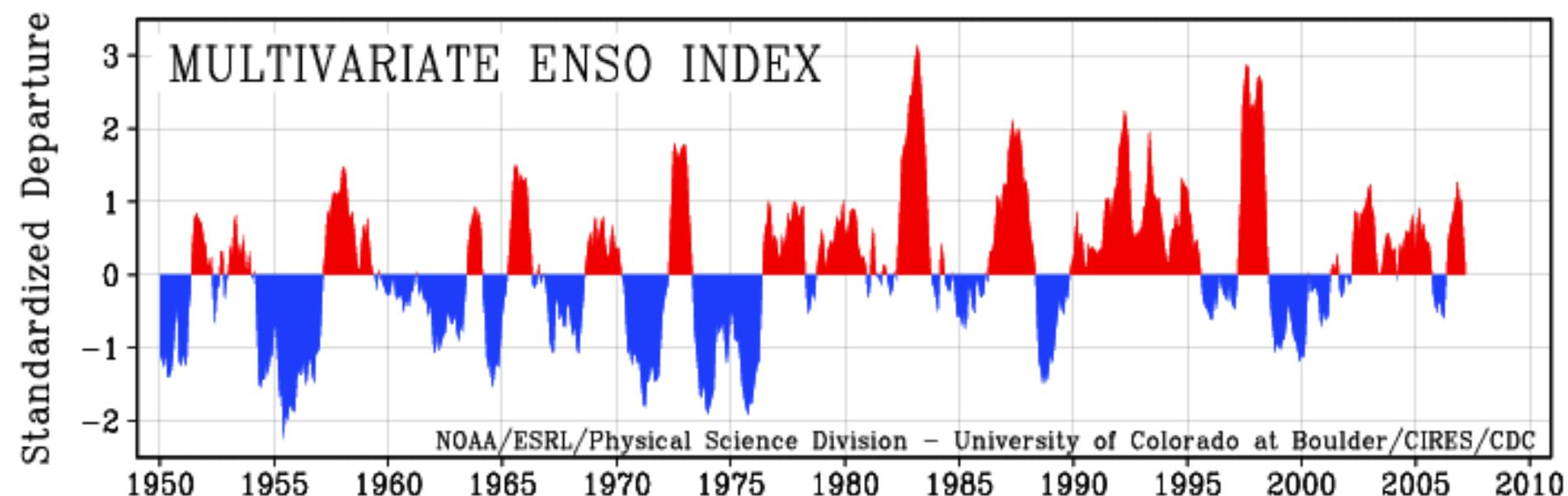
# Water Year 2007 (October – March)



# What Comes Next?

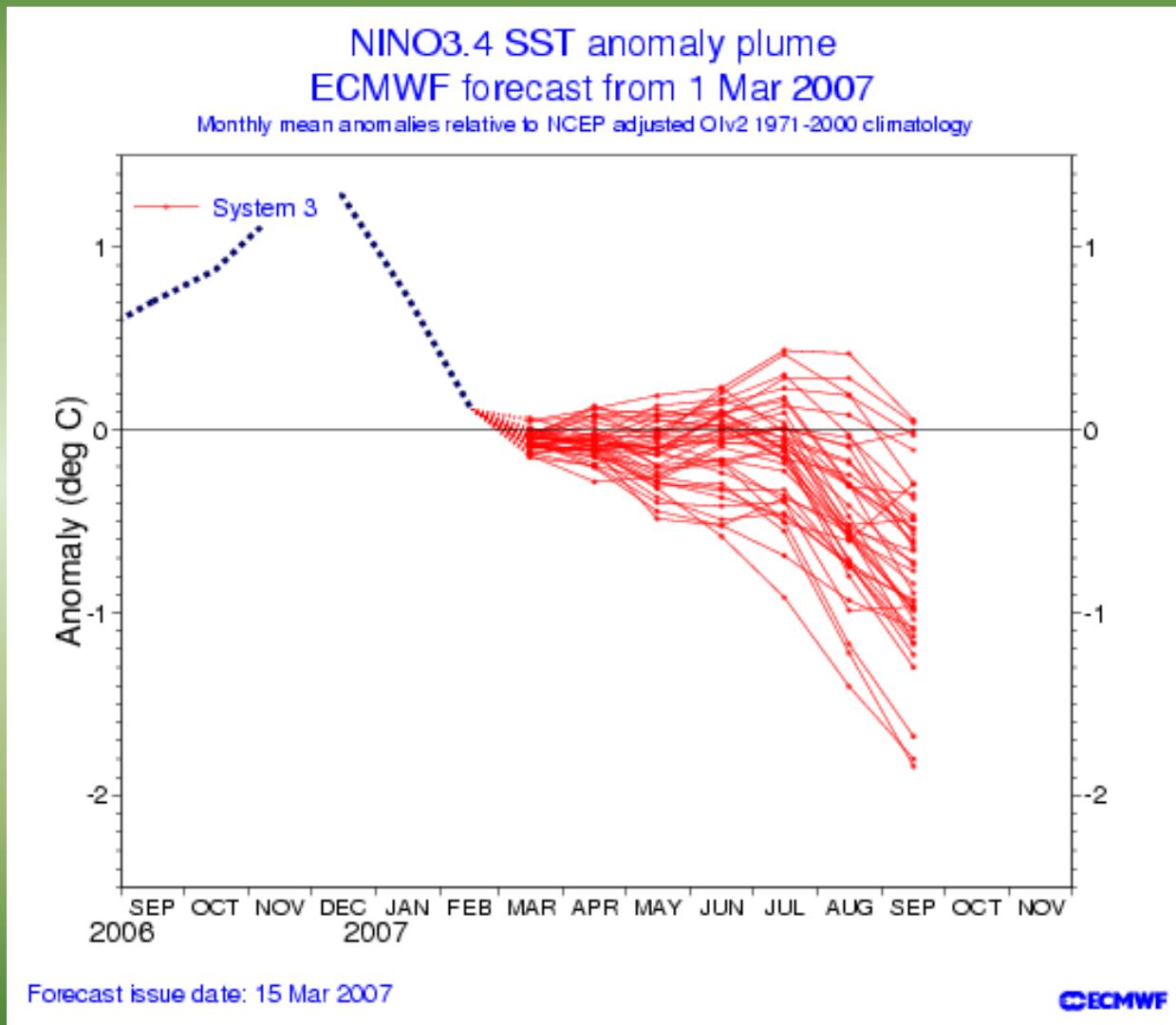


# Multivariate ENSO Index (MEI)

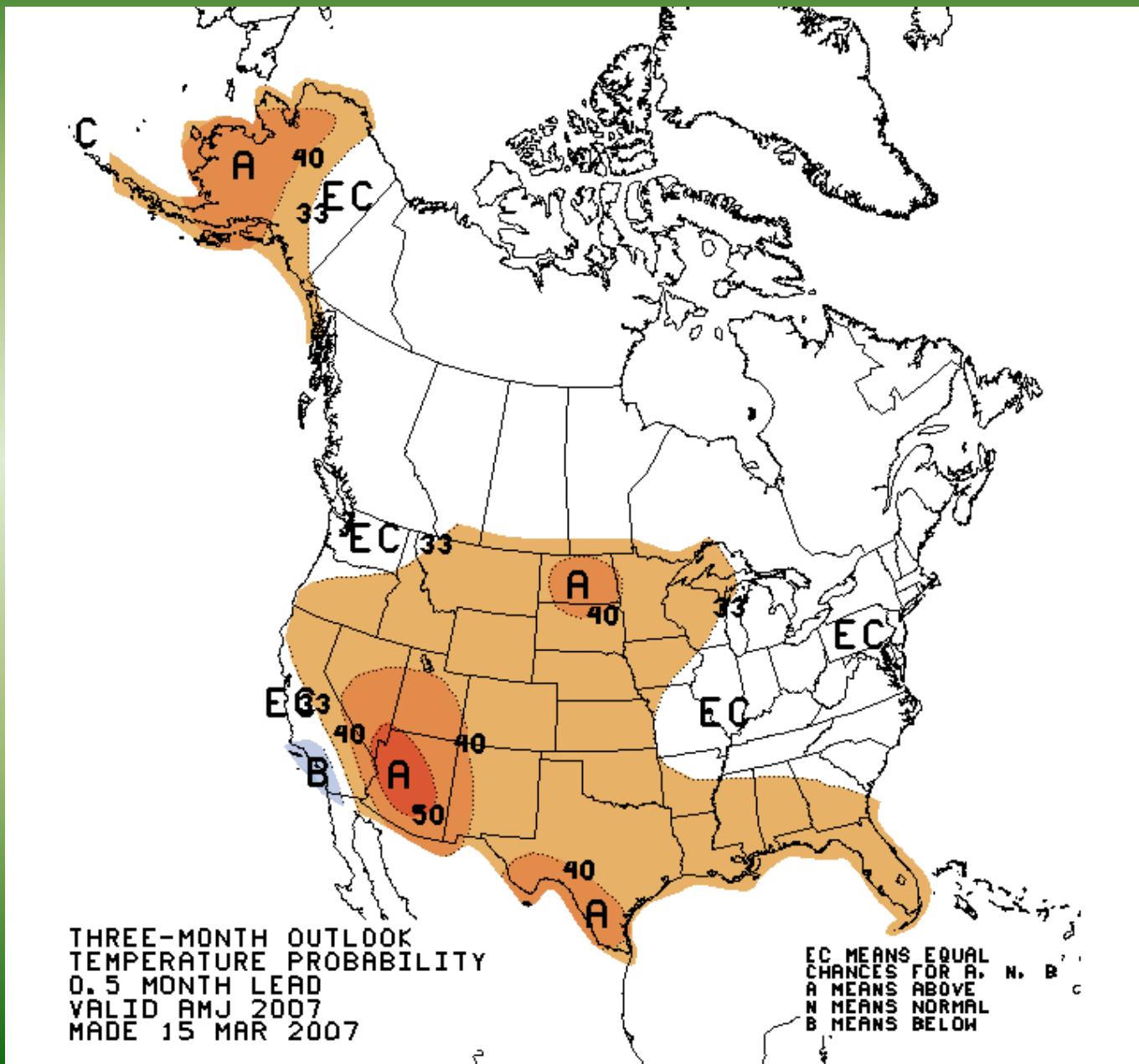


Last update: April 5, 2007

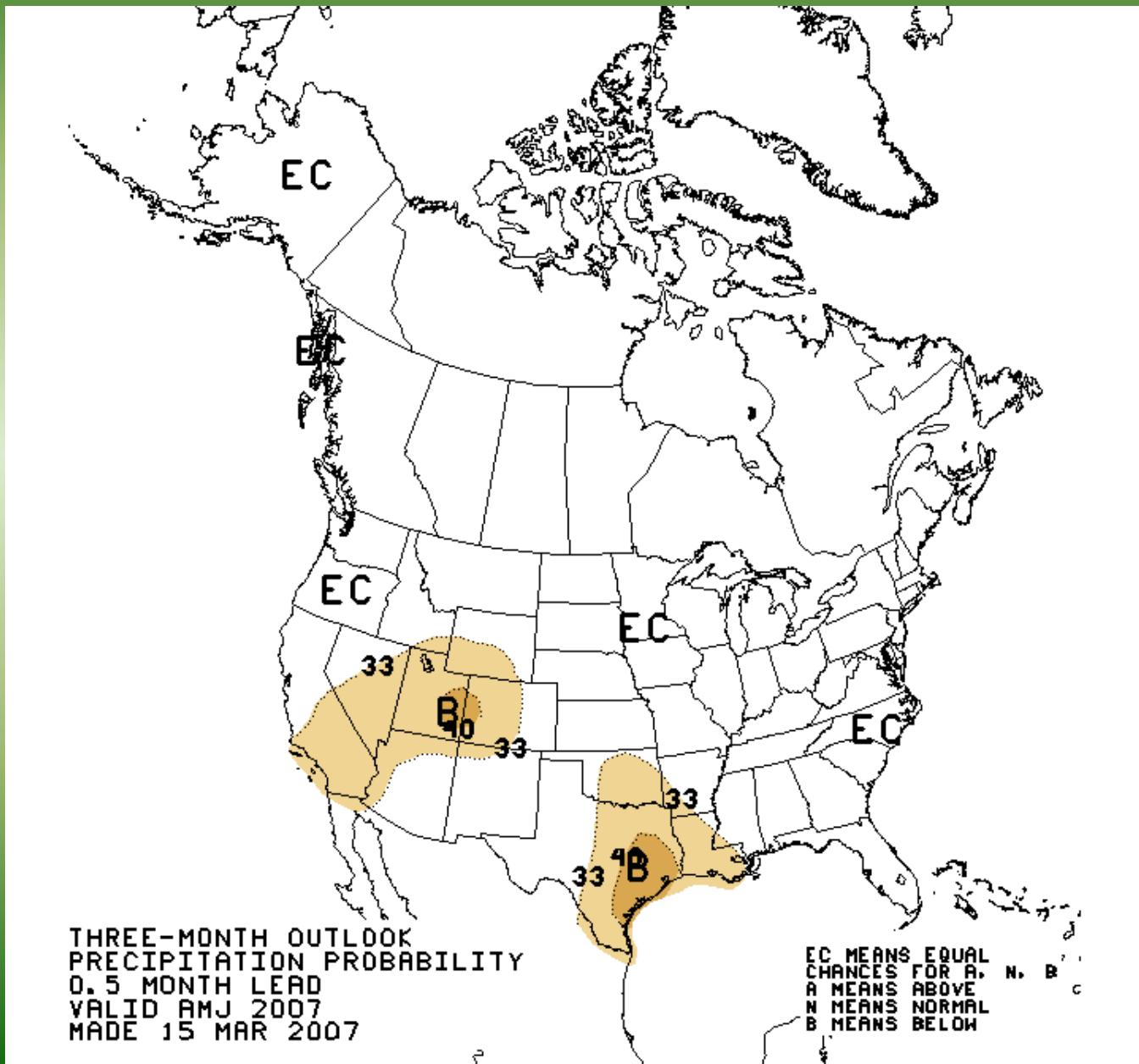
# El Nino Forecast



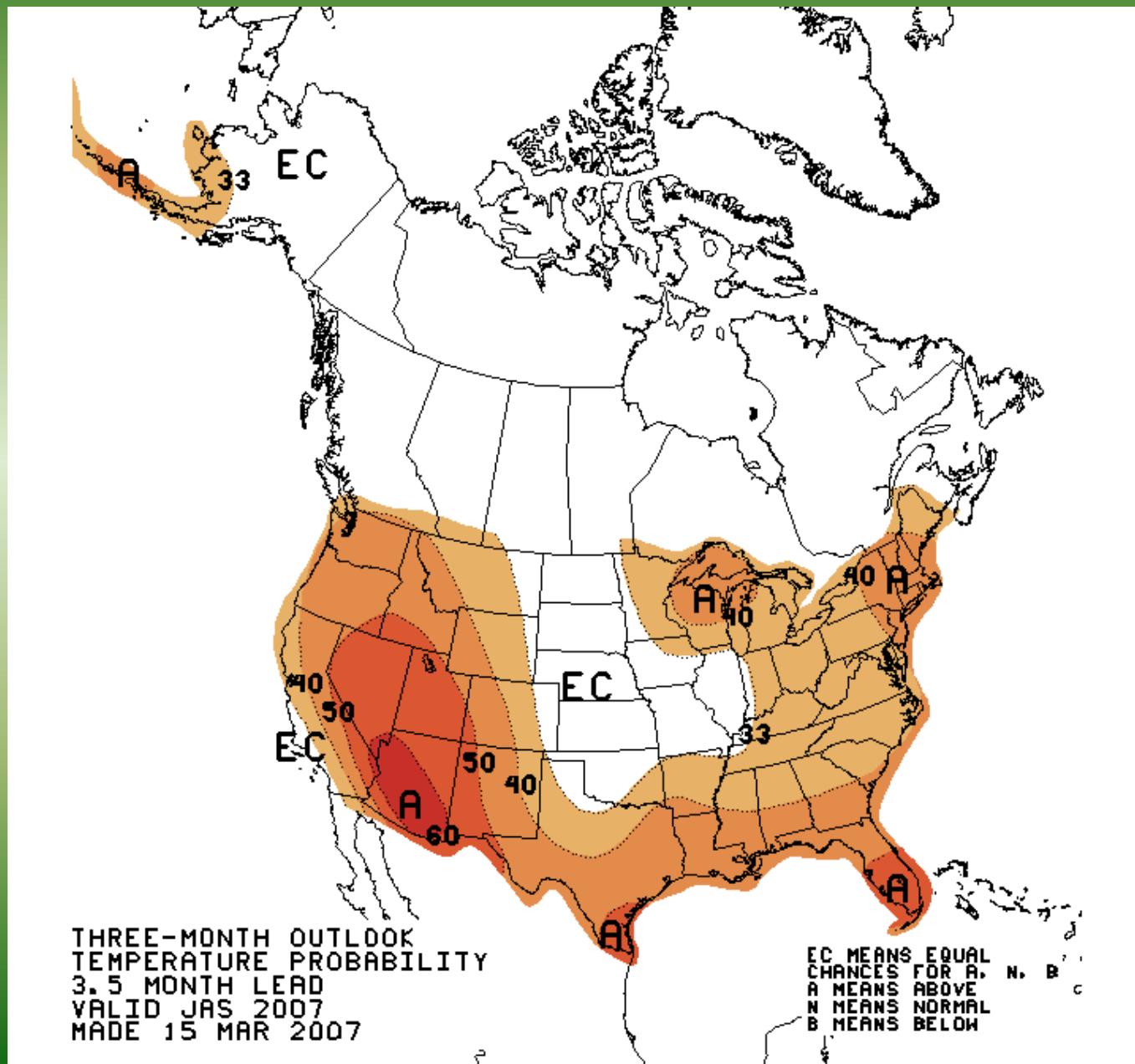
# Apr-Jun Temperature



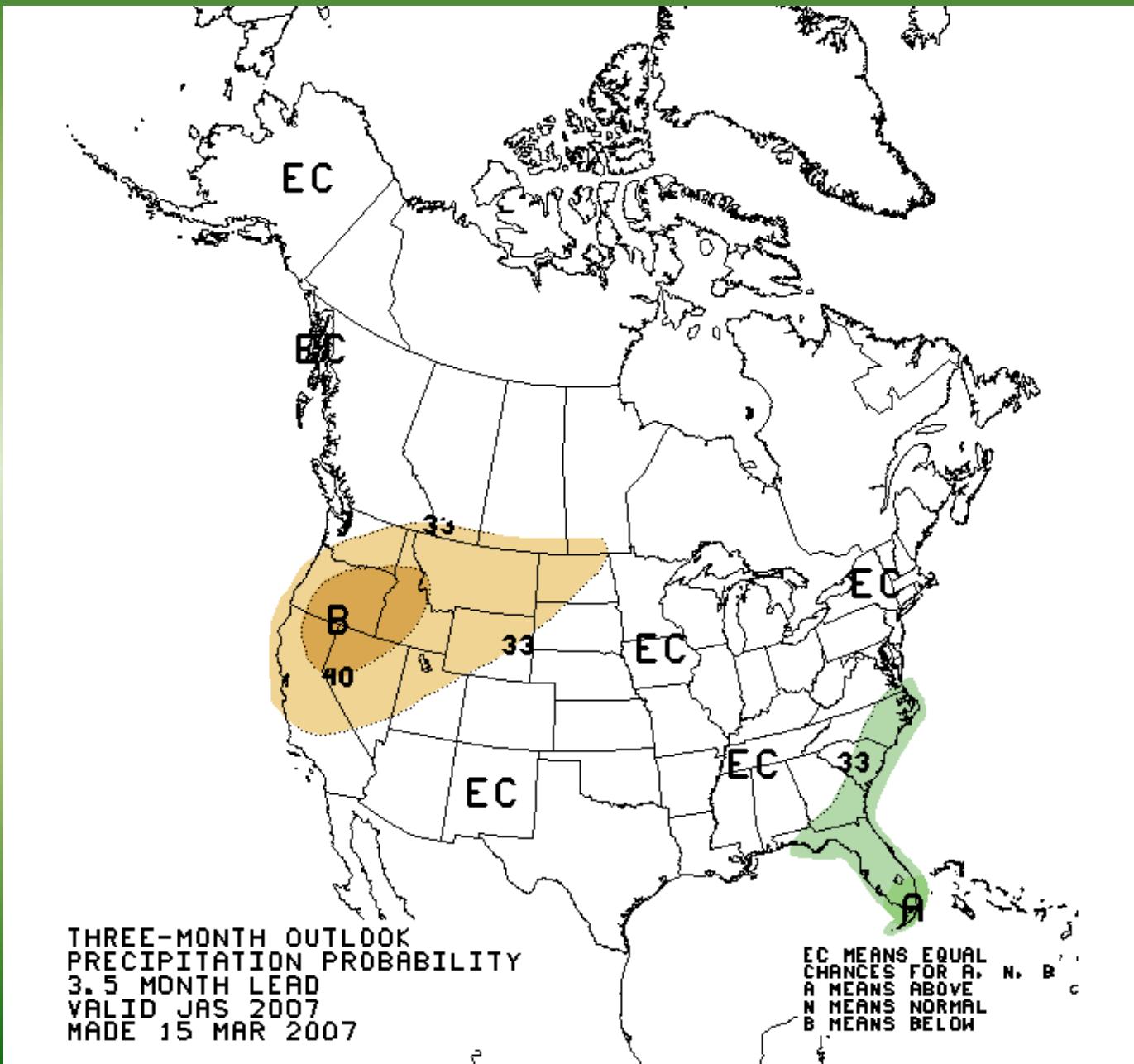
# Apr-Jun Precipitation



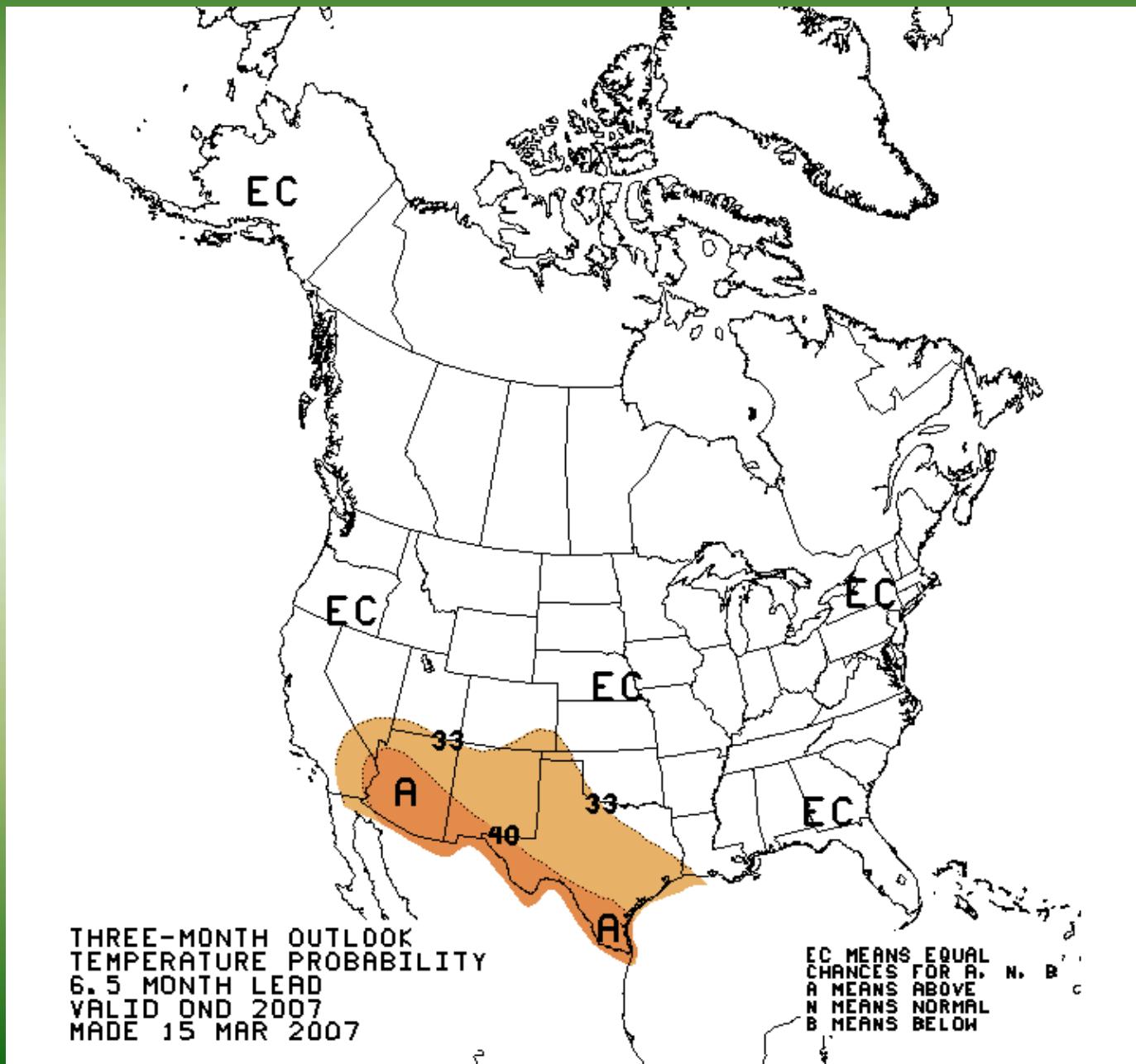
# Jul-Sep Temperature



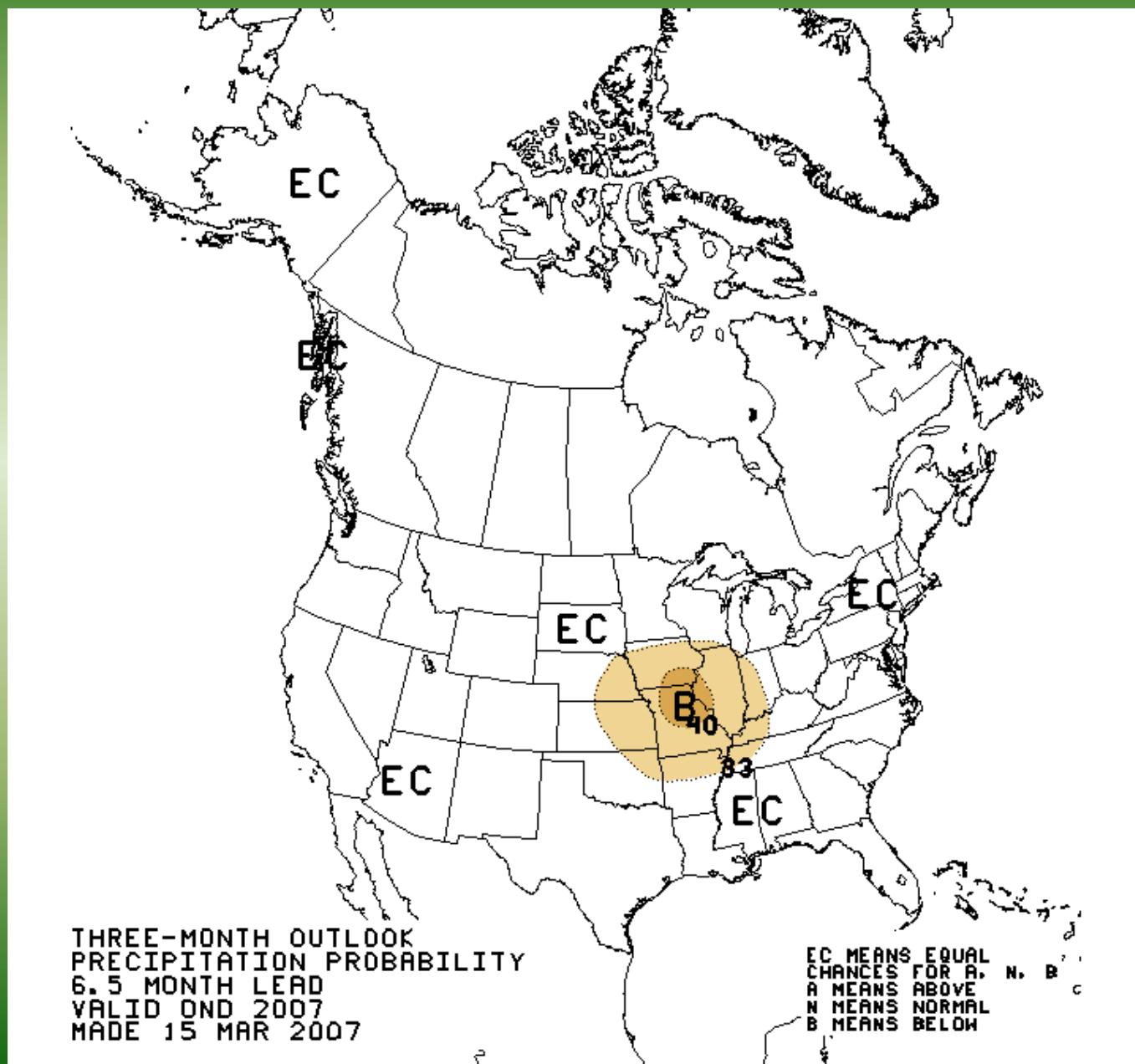
# Jul-Sep Precipitation



# Oct-Dec Temperatures



# Oct-Dec Precipitation



# Working together to monitor drought --

## Join CoCoRaHS!



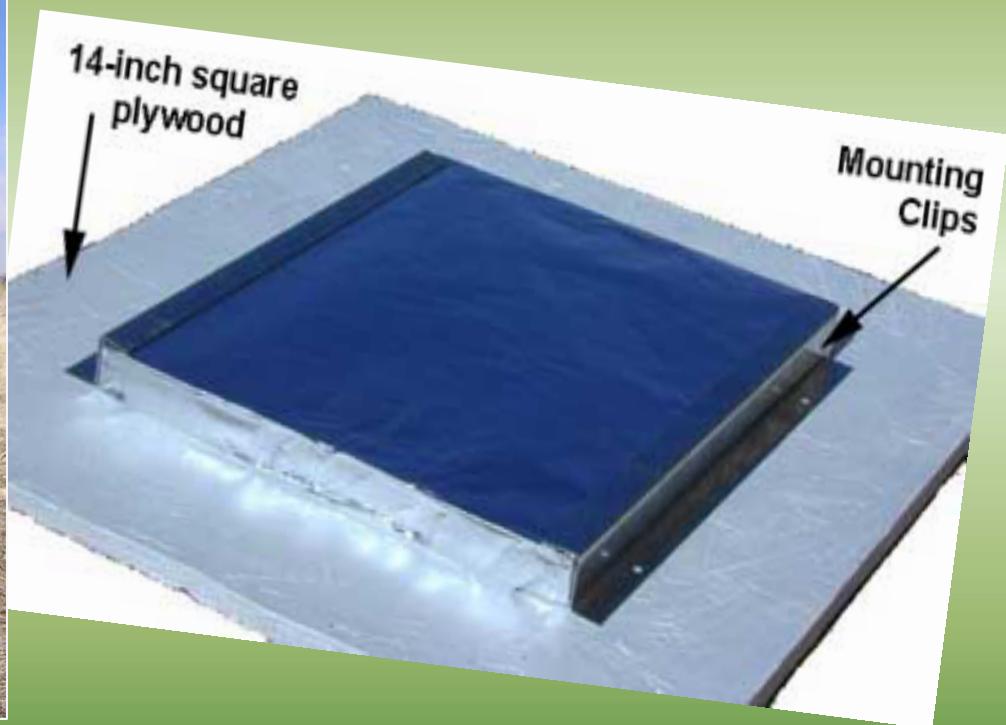
<http://www.cocorahs.org>



# CoCoRaHS

Community Collaborative Rain, Hail, and Snow Network

<http://www.cocorahs.org>



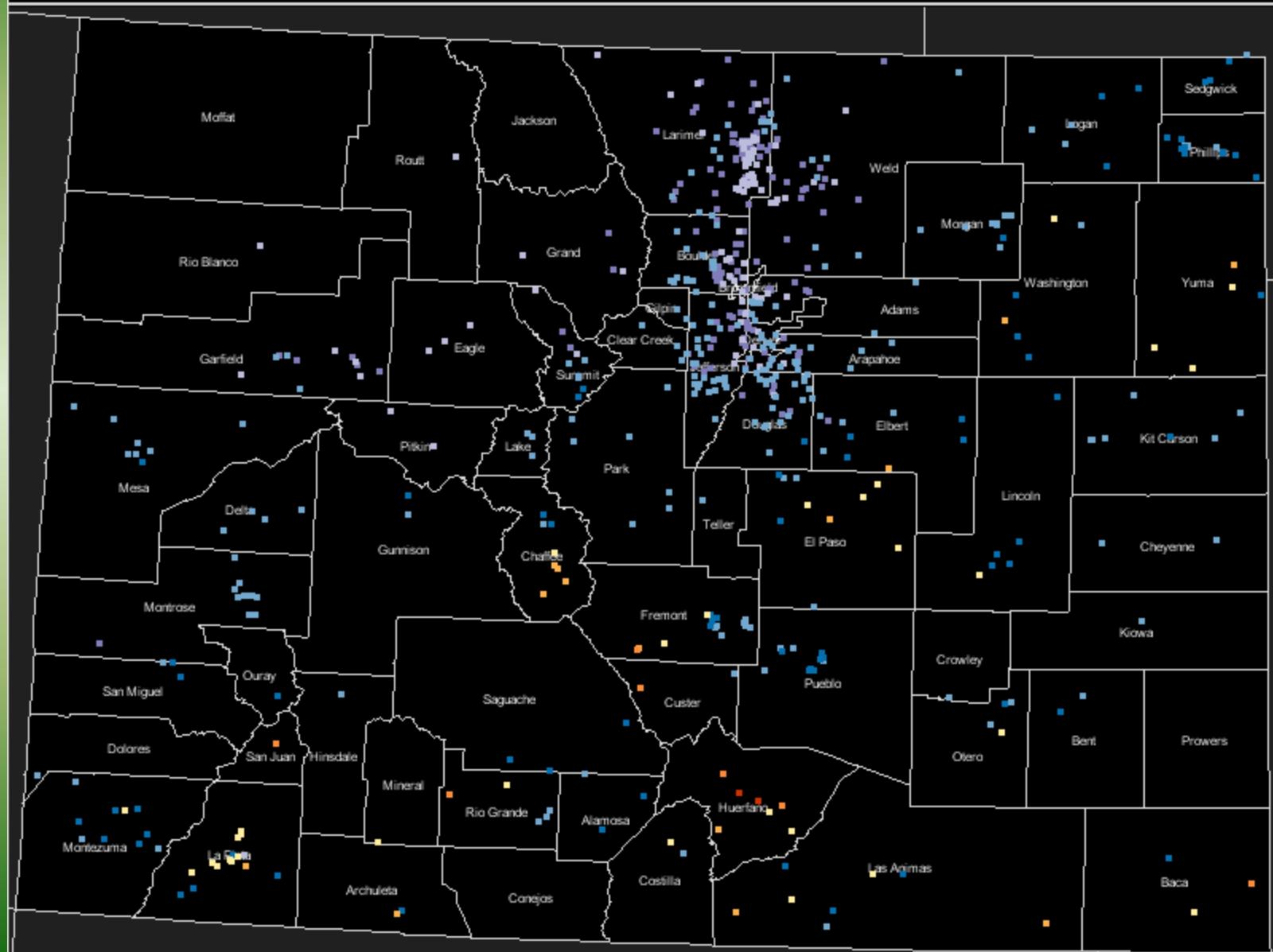
Support for this project provided by NOAA Office of  
Educations and many local charter sponsors.

# CoCoRaHS Precipitation for Apr 13, 2007

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

Colorado 4/13/2007

0.0 Trace 0.01 - 0.17 0.17 - 0.34 0.34 - 0.51 0.51 - 0.68 0.68 - 0.85 0.85 - 1.02



# Colorado Climate Center

## Colorado State University

- *Data and Power Point Presentations available for downloading*
- <http://ccc.atmos.colostate.edu>  
*click on “Drought”  
then click on “Presentations”*

